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PLM305

Managing Technical Objects

mySAP ERP Operations: Support

Date _____

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Education Website _____

Participant Handbook
Course Version: 63
Course Duration: 2 Days
Material Number: 50086270

An SAP course - use it to learn, reference it for work

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About This Handbook

This handbook is intended to complement the instructor-led presentation of this course, and serve as a source of reference. It is not suitable for self-study.

Typographic Conventions

American English is the standard used in this handbook. The following typographic conventions are also used.

Type Style	Description
Example text	Words or characters that appear on the screen. These include field names, screen titles, pushbuttons as well as menu names, paths, and options. Also used for cross-references to other documentation both internal (in this documentation) and external (in other locations, such as SAPNet).
Example text	Emphasized words or phrases in body text, titles of graphics, and tables
EXAMPLE TEXT	Names of elements in the system. These include report names, program names, transaction codes, table names, and individual key words of a programming language, when surrounded by body text, for example SELECT and INCLUDE.
`Example text`	Screen output. This includes file and directory names and their paths, messages, names of variables and parameters, and passages of the source text of a program.
`Example text`	Exact user entry. These are words and characters that you enter in the system exactly as they appear in the documentation.
`<Example text>`	Variable user entry. Pointed brackets indicate that you replace these words and characters with appropriate entries.

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Icons in Body Text

The following icons are used in this handbook.

Icon	Meaning
	For more information, tips, or background
	Note or further explanation of previous point
	Exception or caution
	Procedures
	Indicates that the item is displayed in the instructor's presentation.

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Course Overview

The intensive training course PLM305 *Managing Technical Objects* expands on the object and technical system structuring topics introduced in PLM300 *Plant Maintenance* from the point of view of both maintenance and customer service. On the one hand, we also look at more advanced functions relating to functional locations, equipment and bills of material. On the other hand, we also deal with serial numbers, measuring points and counters, and classification in conjunction with technical objects.

The Customizing settings required are shown for each topic area.

Target Audience

This course is intended for the following audiences:

- Project lead
- Project team

Course Prerequisites

Required Knowledge

- PLM300 Plant Maintenance

Recommended Knowledge

- SAP01
- SAPPLM

Course Goals

This course will prepare you to:

- The training course PLM305 *Managing Technical Objects* deal in detail with object and technical system structuring, which forms the backbone of the development of maintenance and service measures in the areas of Enterprise Asset Management and Customer Service.
- Here we get to know all the necessary customizing settings

Course Objectives

After completing this course, you will be able to:

- Create and structure functional locations
- Apply equipments

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- Apply classification
- Apply bills of material and assemblies
- Apply serial numbers
- Apply measuring points and counters

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Unit 1

Functional Locations

Unit Overview

This chapter follows on from the chapter *Technical Objects* in the course PLM300, recapitulates the term and concept of the functional location and then expands on the application of functional locations with a whole range of detailed functions and their related Customizing settings.

Unit Objectives

After completing this unit, you will be able to:

- Enter complete location structures quickly
- Use data transfer
- Use reference locations
- Create alternative labels
- Work with alternative labeling systems

Unit Contents

Lesson: Structuring of Functional Locations 2
Exercise 1: Functional Locations 17
Lesson: Alternative Labeling 33
Exercise 2: Alternative labeling 35

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Lesson: Structuring of Functional Locations

Lesson Overview

This lesson deals with detailed functions for structuring functional locations

Lesson Objectives

After completing this lesson, you will be able to:

- Enter complete location structures quickly
- Use data transfer
- Use reference locations

Business Example

- In the enterprise, complex system structures are managed from a maintenance perspective.
- These structures are multi-level and organized hierarchically.
- Examples include the connected clarification plant, production lines, offices and buildings, or the internal power station.

Revision

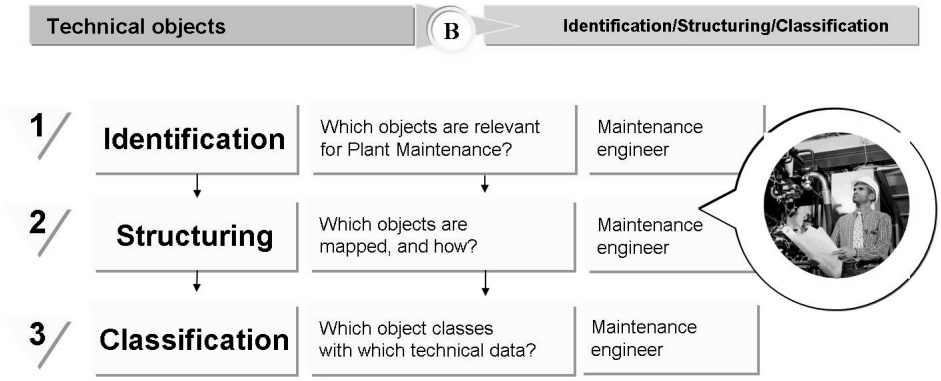

Figure 1: Process for Structuring Technical Objects

Step 1: When you start to map technical objects, you need to decide which objects are relevant for Plant Maintenance, that is, which objects require maintenance measures and which objects should be evaluated.

Step 2: In the second step, you choose the structuring instruments for each object (functional location, equipment, assembly, material), and create the structure.

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Step 3: In the third step, you create characteristics (= technical characteristics: for example, electrical output) and classes (for example, pump classes). All technical characteristics become available for an object when a technical object (for example, equipment) is assigned to a class.

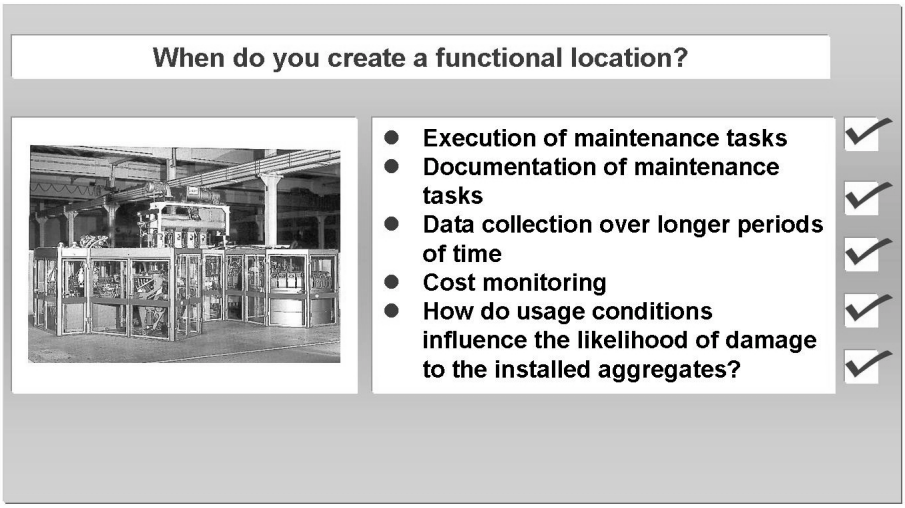

Figure 2: Criteria for Functional Locations

You should use functional locations to structure your systems if:

You want to represent the structures of the technical systems in your company according to functional criteria.

Maintenance tasks have to be performed for the individual parts of your technical system and this work must or should be recorded

Technical data for certain parts of your technical system has to be collected and evaluated over a longer period of time

The costs of maintenance tasks have to be monitored for certain parts of your technical system

You want to perform analyses regarding the influence of usage conditions on damage susceptibility for the pieces of equipment installed

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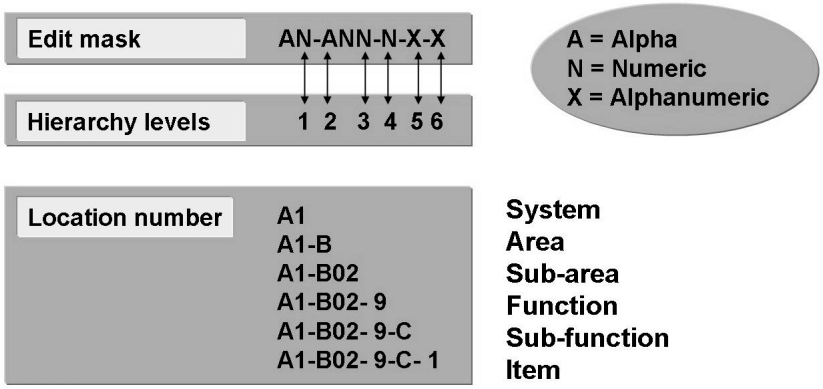

Figure 3: Structure Indicator

The labels (previously: numbers) for functional locations are created using the **structure indicator**. The structure indicator consists of two input fields:

- the **edit screen**
- the **hierarchy levels**

The **edit screen** is used to control which characters may be used when a label is assigned (letters, numbers, or both) and how these characters are grouped together or split. The **hierarchy levels** field is used to define which level ends at which character and how many hierarchy levels the structure may contain.

The label for a functional location can comprise a maximum of 40 characters (= maximum length of the coding template).

Detailed Functions for Functional Locations

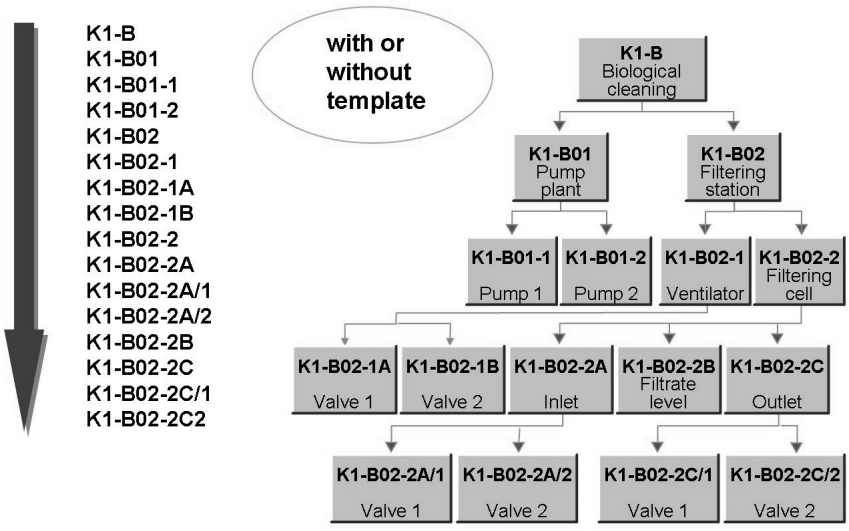

Figure 4: List Entry for Functional Locations

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You only enter a master record for a functional location if the following prerequisites have been met:

The structure of the system to be represented in the system has been defined.

The table settings for structuring functional locations have been entered in the system using the Customizing function.

You must know which level of the functional location you wish to create in order to represent its hierarchical structure correctly in the system. The top-down principle applies here: You start with the uppermost level and then enter the respective subordinate levels.

You must know whether the description of the functional location should be entered according to a particular, company-specific system, to simplify search operations.

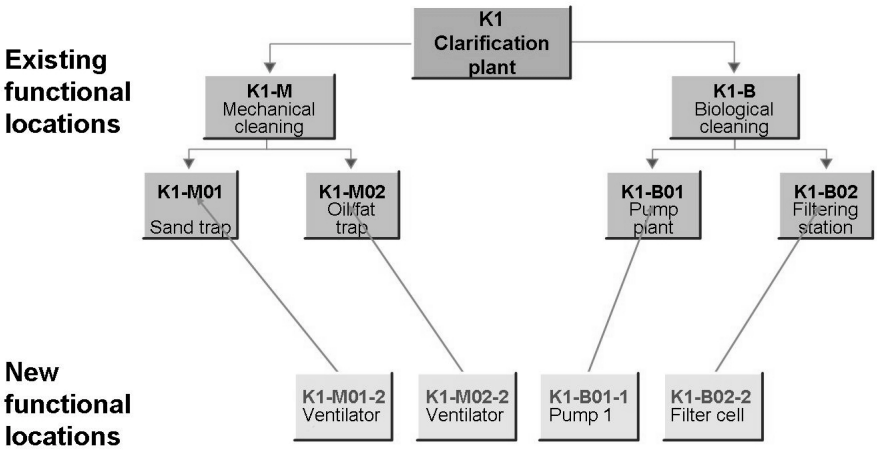

Figure 5: Automatic Assignment Upon Creation

If you create a functional location, the system uses the structure indicator to assign it automatically to the corresponding place in an already existing hierarchy with the same structure indicator.

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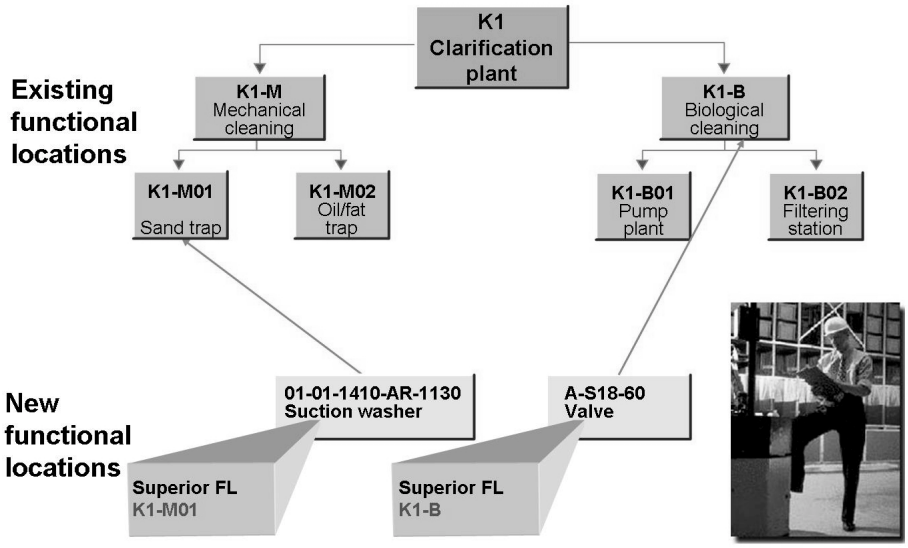

Figure 6: Manual Assignment

It is also possible to support the transfer of data from superior functional locations to subordinate functional locations even if the generic structure of the location numbers has not been used within the location hierarchy. You do this by assigning the directly superior location manually when you create a functional location, thereby overriding automatic determination of the superior location.

This is particularly necessary if individual units of a technical system in your company are identified by a label that describes the position of the unit in the system as a whole. These tag numbers often consist of a letter that stands for the equipment category (for example, M for Motor, or P for Pump) and a sequential number (for example, pump station 0115). This identifier is generally only unique within a plant or a technical system.

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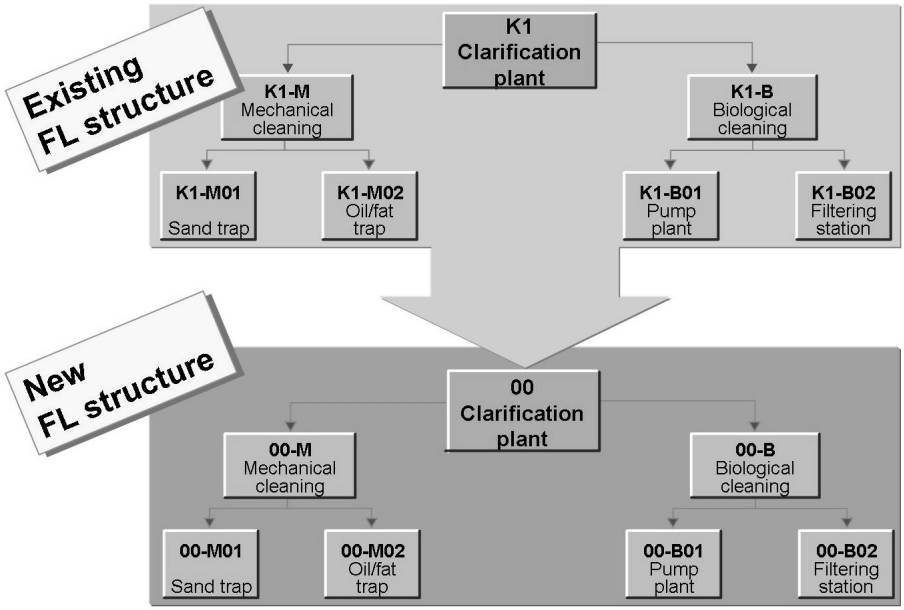

Figure 7: Copying a Complete Functional Location Structure

If you want to represent a location structure that already exists in a similar form in the system, you can use this structure as a template for the new structure. You use this function if the data of the similar structure, to which you refer, has already been saved. You can use this function to access the database and select the objects to be copied.

If the functional location that you are using as a template is based on a reference functional location, this reference is copied at the same time. However, the superior functional location in the location structure is not copied by the system for the new functional location, but searched for again automatically.

If the location used as a template is classified, you can also copy its classification into the new functional location.

If the location used as a template has got assigned measuring points, you can also copy these into the new functional location.

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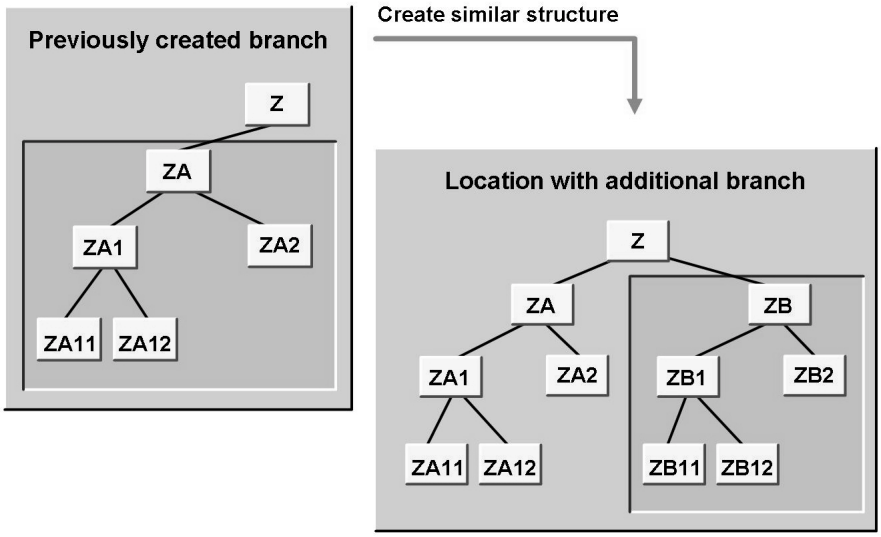

Figure 8: Copying Parts of Structures

The entry of similar structures within a functional location or reference functional location is facilitated by the Change structure function. You can use this function to change and insert a structure branch whose label only deviates at one level from the branch already entered.

You use this function provided that you have not saved the data of the similar structure, to which you are referring. You cannot use this function to access the database.

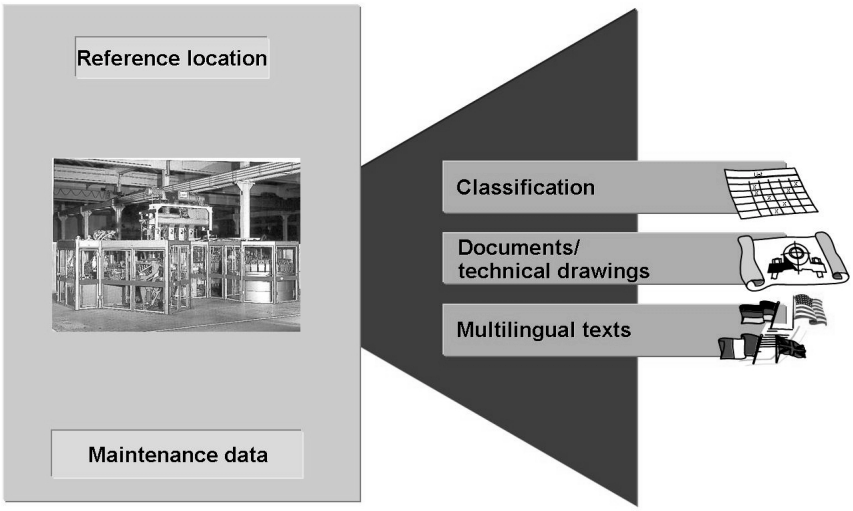

Figure 9: Reference Functional Location

A reference functional location can be used to help create and manage locations. You use it to create and manage several similar functional locations in the system.

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You define and manage reference functional locations in individual master records. However, they do not represent actual locations, but are assigned to real functional locations as reference locations.

The master record of a reference functional location contains information that is valid for all functional locations assigned to it. This means that when you create functional locations using reference functional locations, you only need to enter location-specific data.

The system manages the master records for reference functional locations at client level. This means that their labels are unique for an entire corporate group.

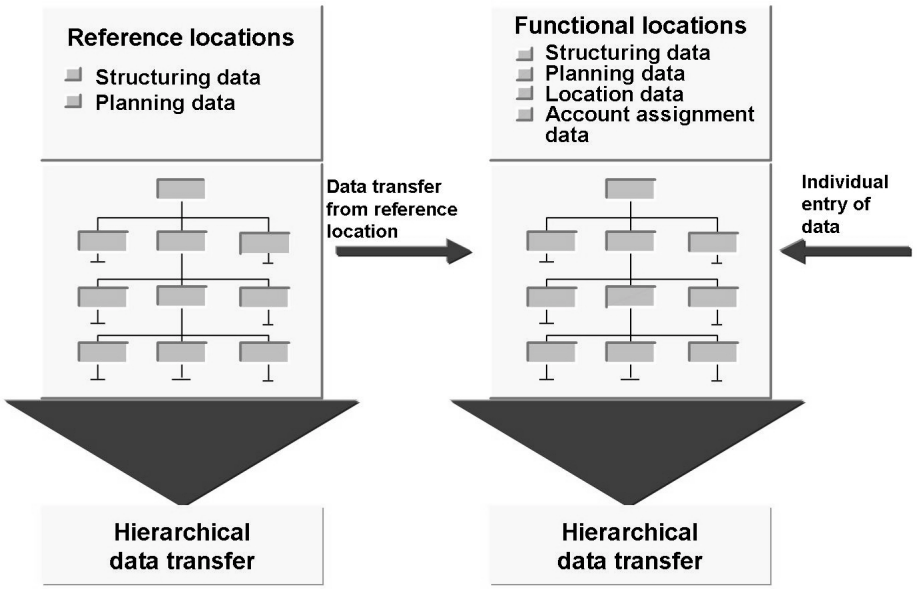

Figure 10: Data Transfer

If a hierarchy is created using functional locations, different options are available for inheriting data at subordinate levels.

The objective is to assign certain central data at the highest level possible, and transfer it automatically to as many objects as possible.

This transfer can be controlled centrally from the uppermost functional location for all fields in the master record. However, the transfer can also be deactivated for a particular level in the hierarchy and a particular field (for example, cost center), which enables each field to be maintained individually.

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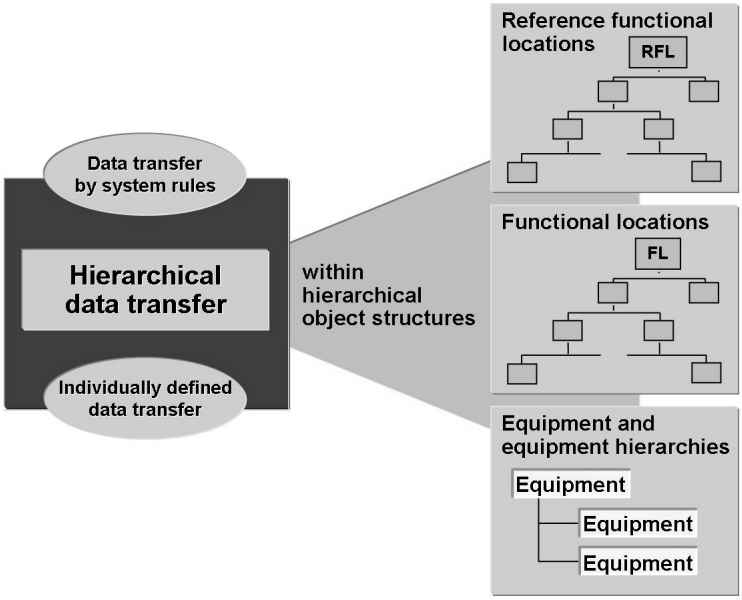

Figure 11: Hierarchical Data Transfer

The following principle applies for data transfer in functional locations and equipment hierarchies:

Starting point: superior object

For example, if a piece of equipment is installed from a functional location, there is **no** query with regard to data transfer. All fields in the equipment master that contain entries at this point remain unaffected and are identified as **individually maintained** fields. Data from the functional location is automatically copied to any fields that do not contain entries.

Starting point: subordinate object

If the installation is performed from the equipment master record, the data transfer can be influenced using the function *Installation with Data Transfer*. You can then select from a list of fields which field should be maintained individually – in other words, independent of the functional location – and which field should be copied from the functional location.

It is possible to subsequently switch to individual maintenance or copying from the superior object:

- With the functional location, you can use the function *Data Origin* to change the data inheritance options for each field.
- For equipment, the switch is made by dismantling followed by an installation and configuration of fields using the function *Installation with Data Transfer*

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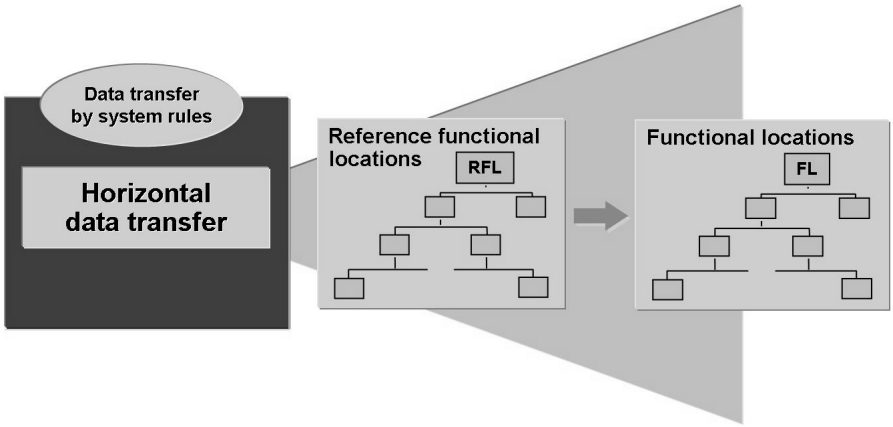

Figure 12: Horizontal Data Transfer

By using reference functional locations, you have the option of specifying category-specific data once for each asset category, then transferring this data to the corresponding functional locations and pieces of equipment and sub-equipment installed at them.

Example: The responsible work center of the functional location *Ventilators* changes for several clarification plants. The employee responsible for maintaining master data makes the change in the master record for the reference functional location *Ventilators* and saves the entry. The system makes the change automatically for all functional locations that have been assigned to this reference location and pieces of equipment that are installed at these locations. It then issues a message informing the employee of the number of functional locations and pieces of equipment to which the data was transferred.

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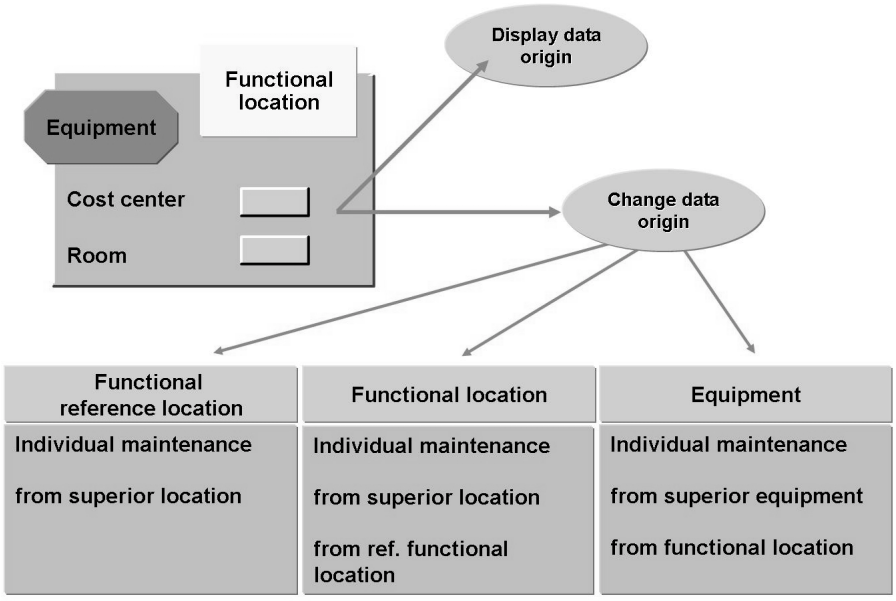

Figure 13: Data Origin

For reference functional locations and functional locations, you can display the origin of the data in the master data fields. There are two different display options available here:

- Individual display for an individual field
- Overview display

For the individual master data fields for reference functional locations and functional locations, you can determine where the data entered should originate from. You can specify for reference functional locations whether the data should originate from a superior location in the structure or should be maintained individually for this master record.

You can specify for functional locations whether the data should originate from a superior location in the structure, should originate from a reference functional location, or should be maintained individually for this master record.

For pieces of equipment, there is an overview display (list of data origin) for each tab page, but no field-based display or change option.

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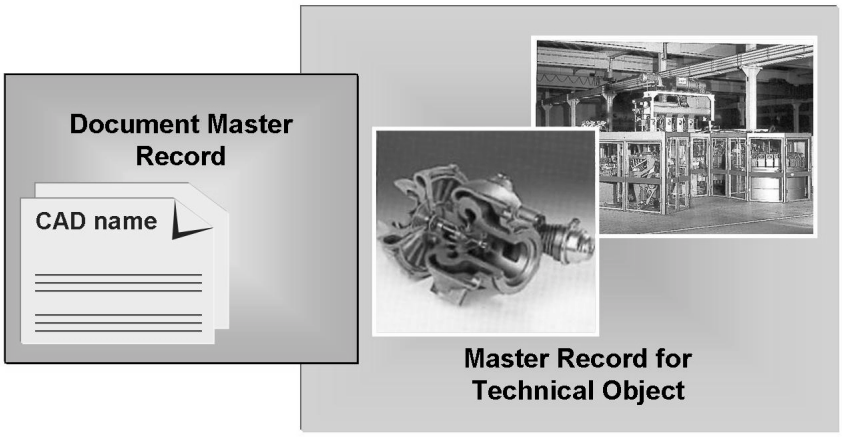


Figure 14: Document Assignment

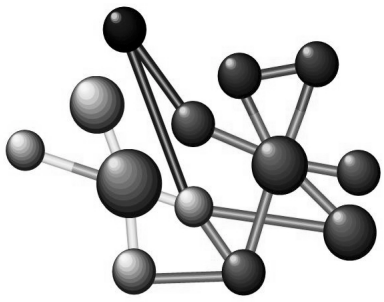
Information about technical objects to be maintained can also exist in the form of **documents** (for example, construction drawings or photographs).

Documents are managed, visualized, and archived as master records in the **Document Management System**. Document management is one of the central logistics functions.

Since documents are often required when executing maintenance tasks, you can link the document master records directly to the master record of the technical object. Almost every type of document can be made available to technical objects using the display program (viewer).

Several documents can also be assigned to a master record for a technical object.

Product Structure Browser



- **Usable for technical objects**
- **With processing functions**
  - **Copy part of tree**
  - **Rename part of tree**
  - **Relocate part of tree**
  - **Status operations on parts of tree**
  - **Change individual objects**

Figure 15: Product Structure Browser

The **product structure browser** is part of the Product Data Management (PDM) and is used to display and edit product structures.

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Since Release 4.6 it is also possible to display and edit **technical objects** and their structures in the product structure browser. In contrast to traditional structure display in Plant Maintenance, here you can also edit directly in the structure tree (for example, copy parts of structures, add new objects).

You can use a filter to specify which objects are displayed and which are hidden.

The editing is supported by functions such as drag & drop (for example, inserting and removing equipment, moving functional locations).

The transaction code of the product structure browser is **CC04**. In the menu tree, the product structure browser is located in the central functions of the Logistics in the Engineering area.

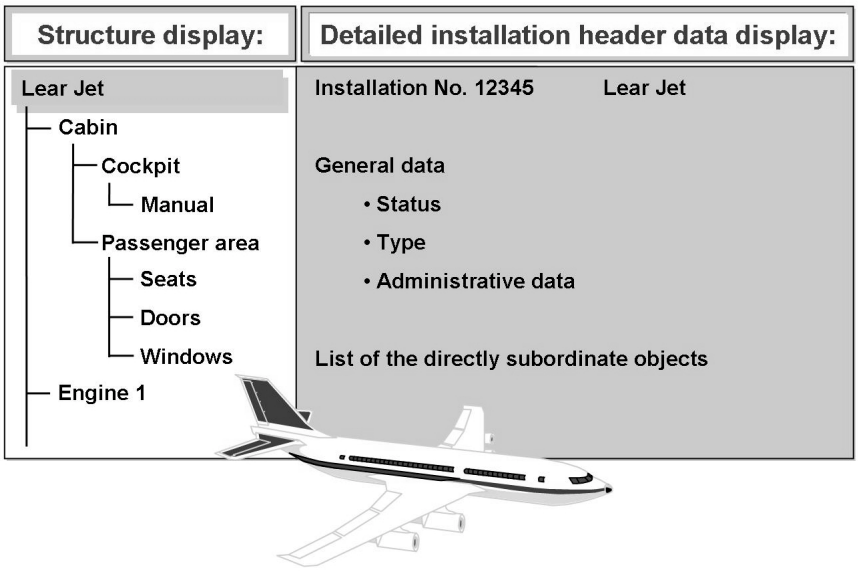

Figure 16: Installation (Ibase)

You use the Installation Management to display and manage **products**. You can assign related **equipment**, **materials**, **serial numbers** and **documents** to a shared installation as **components**. The Installation Management can also be used for documentation purposes.

An installation may, for **example**, include an airplane with all service-relevant components. Or it may deal with an unassembled airplane whose components are already managed collectively in the planning and production phase. An installation can also comprise of two wings that will be integrated in the superior installation "Airplane" when production is complete.

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Advantages of an Installation:

- Multilevel representation of components
- Time-based delimination possible (insertion/removal time of a component)
- Components do not have to be represented as equipment master records
- Additional data entry for components

The **aim of the installation** is in particular to generate a structure from a production or sales order.

The installation is not currently regarded as an alternative to existing object structuring methods in Plant Maintenance. This is because the link to maintenance processing (notification/order) has not been realized. In addition, the mapping of equipment hierarchies and the documentation of changes using change documents are currently not possible.

Customizing for Functional Locations

- **Structure indicator**
- **Functional location category**
  - **Partner determination procedure**
  - **Object information**
  - **Customer system**
  - **Change documents**
  - **Status profile**
  - **Measuring point category**
- **Reference location category**
- **Alternative labeling**
  - **Activation**
  - **Define labeling systems**

Figure 17: Customizing Settings for Functional Locations

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Exercise 1: Functional Locations

Exercise Objectives

After completing this exercise, you will be able to:

- Enter and copy location structures
- Use data transfer
- Use reference locations
- Use alternative labels

Business Example

All the locations in the enterprise should be represented in the SAP system. This includes the creation of a number of functional locations, such as workshops, production lines, green areas, car parks and so on, with slightly different structural specifications, but often the same organizational assignment.

Task 1:

General Questions About Functional Locations:

1. Is the structure indicator unique across the system?

2. How do you proceed if you have assets (functional locations) with the same ID (= number) in several plants?

3. Which functions can be executed with functional locations and reference locations?

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Function	Functional Location	Reference Location
Install equipment		
Create order		
Assign measuring point		
Classification		
Assign documents		
Enter multilingual texts		

Task 2:

Entering Reference Locations

The reference location structure displayed in the following table should be represented in the system.

For this, you first have to define a suitable structure indicator in Customizing.

Then you enter the reference locations in the specified sequence while observing the respective hierarchy level.

Reference Location	Description	Level	Superior reference location
R##	System ##	1. Level	?
R##-A	Area A	2. Level	?
R##-B	Area B	2. Level	?
R##-1	Area 1	2. Level	?
R##-12	Sub-area 2	3. Level	?
R##-123-A	Subfunction A	5. Level	?
R##-123	Function 3	4. Level	?
R##-123-B	Subfunction B	5. Level	?
R##-123-AA	Item A	6. Level	?

1. Create a suitable structure indicator Gr## while observing the following requirements.

   The system always has three characters and is represented alphanumerically (1st level).

   The areas of the system are represented alphanumerically (2nd level).

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The sub-areas are represented numerically (3rd level).

The functions are represented numerically (4th level).

The subfunctions and items are represented alphabetically (5th/6th level).

How do you proceed?

2. Create the reference location hierarchy specified above using your structure indicator Gr##.

   How do you proceed?

   Use the following data:

Description	System ##
Planning plant	1000
Planner group	I##
Responsible work center	T-ME##
Plant of the responsible work center	1000

3. Which reference location has an “incorrect” superior reference location?
4. How can you correct this?

Task 3:

Copying Parts of Structures

1. In the structure of functional location ##, part of the structure is for sludge processing.

   Which functional locations belong to this part?

2. Which structure indicator does the system ## use?
3. In the clarification plant there is another part for sludge processing with the number ##-SLC, which you want to look exactly the same in the structure as the sludge processing mentioned above.

   How do you proceed in order to insert this part of the structure as easily as possible?

Hint: Make sure you use the correct structure indicator!

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4. Structural Display

   Display the structure of functional location ## in list form and as a graphic. Which menu path do you choose?

Task 4:

Hierarchical Data Transfer Across the Complete Structure

1. To which main work center and maintenance planner group is functional location ## assigned?
2. Enter your work center T-ME## and your maintenance planner group I##. What system message is issued when you save?
3. Check whether the information has been transferred to all the subordinate functional locations.

   What is the easiest way of doing this?

Task 5:

Hierarchical Data Transfer Across Parts of the Structure

1. Which cost center is assigned to functional location ##?
2. The complete functional location structure (apart from ##-SLC – the part for sludge processing) should be assigned to cost center 4100.

   How do you prevent this part of the structure (##-SLC) from being assigned to the new cost center?
3. What is the simplest way of assigning the new cost center to the remaining functional locations in the structure ##?

Task 6:

Horizontal Data Transfer

1. Create the functional location structure T## as an overall structure from the reference location structure R## that you created previously.

   How do you proceed?
2. Check whether the information from the reference locations has been transferred to the functional locations. Which data is transferred?

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Task 7:

Optional exercise for Customer Service

1. Creating Functional Locations

   Call up the function *Create functional location*.

   Select the structure indicator SERV2 and choose *Refresh screen* so that the edit mask and hierarchy levels are displayed correctly.

   Create a functional location with the number **HTEC##** and functional location category **S**.

   Enter the following data:

   Description: **Hitech Corp. Hamburg**

   Create an individual address for the functional location.

Field Name or Data Type	Values
Planning plant:	**1200**
Sold-to party: Customer number	**T-CSD##**
Sales organization:	**1000**
Distribution channel:	**14**
Division:	**00**

   Save the functional location master record.

2. Creating Subordinate Functional Locations

   Create a functional location with the number **HTEC##-SHIP**, structure indicator **SERV2** and functional location category **S**.

   Enter your functional location **HTEC##** as a copy model. Copy all the sub-objects proposed.

   Change the description to **Hitech Hamburg Shipping Center**.

   Which functional location is proposed as the superior functional location based on the functional location number entered?

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Solution 1: Functional Locations

Task 1:

General Questions About Functional Locations:

1. Is the structure indicator unique across the system?

   Answer: The structure indicator is unique across **all clients** but **not** across all systems.

2. How do you proceed if you have assets (functional locations) with the same ID (= number) in several plants?

   Answer: We recommend using the plant's identification number as the first level of the functional location structure.

3. Which functions can be executed with functional locations and reference locations?

Function	Functional Location	Reference Location
Install equipment		
Create order		
Assign measuring point		
Classification		
Assign documents		
Enter multilingual texts		

a)

Function	Functional Location	Reference Location
Install equipment	*Yes*	*No*
Create order	*Yes*	*No*
Assign measuring point	*Yes*	*No*
Classification	*Yes*	*Yes*
Assign documents	*Yes*	*Yes*
Enter multilingual texts	*Yes*	*Yes*

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Task 2:

Entering Reference Locations

The reference location structure displayed in the following table should be represented in the system.

For this, you first have to define a suitable structure indicator in Customizing.

Then you enter the reference locations in the specified sequence while observing the respective hierarchy level.

Reference Location	Description	Level	Superior reference location
R##	System ##	1. Level	?
R##-A	Area A	2. Level	?
R##-B	Area B	2. Level	?
R##-1	Area 1	2. Level	?
R##-12	Sub-area 2	3. Level	?
R##-123-A	Subfunction A	5. Level	?
R##-123	Function 3	4. Level	?
R##-123-B	Subfunction B	5. Level	?
R##-123-AA	Item A	6. Level	?

1. Create a suitable structure indicator Gr## while observing the following requirements.

   The system always has three characters and is represented alphanumerically (1st level).

   The areas of the system are represented alphanumerically (2nd level).

   The sub-areas are represented numerically (3rd level).

   The functions are represented numerically (4th level).

   The subfunctions and items are represented alphabetically (5th/6th level).

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How do you proceed?

a) Structure Indicator

SAP menu → Tools → Customizing → IMG → Execute Project

Button *SAP Reference IMG*

Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Functional Locations → Create Structure Indicator for Reference Locations/Functional Locations

Button *New Entries*

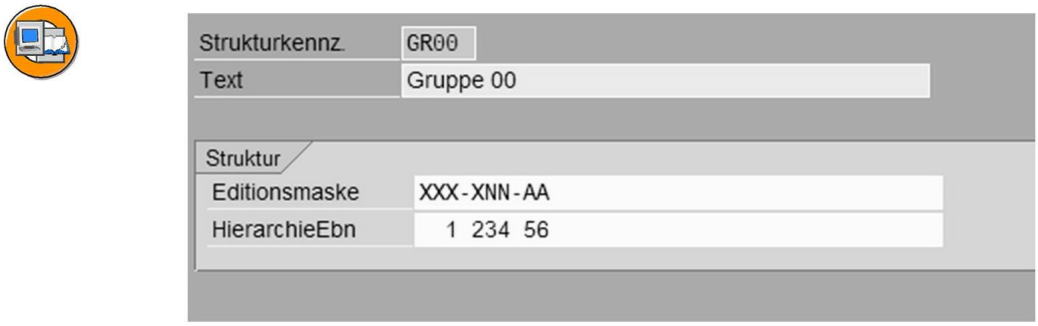

Figure 18: Structure Indicator Solution

2. Create the reference location hierarchy specified above using your structure indicator Gr##.

How do you proceed?

Use the following data:

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Description	System ##
Planning plant	1000
Planner group	I##
Responsible work center	T-ME##
Plant of the responsible work center	1000

a) Entering Reference Locations

SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location → Reference Location → Create

Reference location	Superior reference location
R##	
R##-A	*R##*
R##-B	*R##*
R##-1	*R##*
R##-12	*R##-1*
R##-123-A	*R##-12*
R##-123	*R##-12*
R##-123-B	*R##-123*
R##-123-AA	*R##-123-A*

3. Which reference location has an “incorrect” superior reference location?

a) If you use transaction IL11 to create the reference functional locations, then the superordinate reference location for ##-123-A is “incorrect”.

However, if you use transaction IL14 (List Editing) to create the reference locations, the problem does not arise.

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4. How can you correct this?

   a) To change the “incorrect” superordinate reference location, proceed as follows:

      SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location→ Reference Location→ Change

      Enter ##-123-A

      Structure Change Installation Location

      Enter ##-123.

Task 3:

Copying Parts of Structures

1. In the structure of functional location ##, part of the structure is for sludge processing.

   Which functional locations belong to this part?

   a) ***SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location → Structural Display***

      Entering a Functional Location Label: ##

      Execute (F8)

      ##-SLB, ##-SLB-1, ##-SLB-11, ##-SLB-12, ##-SLB-2, ##-SLB-21, ##-SLB-22, ##-SLB-3, ##-SLB-31, ##-SLB-32

2. Which structure indicator does the system ## use?

   a) Starting from the structure display (see previous step of exercise), double-click on the uppermost functional location ##; *Structure* tab page

      Structure Indicator **STR03**

3. In the clarification plant there is another part for sludge processing with the number ##-SLC, which you want to look exactly the same in the structure as the sludge processing mentioned above.

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How do you proceed in order to insert this part of the structure as easily as possible?

Hint: Make sure you use the correct structure indicator!

a) ***SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location → List Editing → Create***

Set structure indicator **STR03**

Button *Copy reference*

Functional Location ##-SLB

New Location Structure ##-SLC

4. Structural Display

Display the structure of functional location ## in list form and as a graphic. Which menu path do you choose?

Answer: ***SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location → Structural Display***

Task 4:

Hierarchical Data Transfer Across the Complete Structure

1. To which main work center and maintenance planner group is functional location ## assigned?

   a) Work center MECHANIC and maintenance planner group 100

2. Enter your work center T-ME## and your maintenance planner group I##. What system message is issued when you save?

   a) Data transferred to xx functional locations and yy pieces of equipment

3. Check whether the information has been transferred to all the subordinate functional locations.

   What is the easiest way of doing this?

   a) ***SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location → List Editing → Display***

Task 5:

Hierarchical Data Transfer Across Parts of the Structure

1. Which cost center is assigned to functional location ##?

   a) 4110

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2. The complete functional location structure (apart from ##-SLC – the part for sludge processing) should be assigned to cost center 4100.

   How do you prevent this part of the structure (##-SLC) from being assigned to the new cost center?

   a) ***SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location → Change***

      ##-SLC

      Cursor on the Cost Center field

      Menu bar: Edit → Data Origin: select 'Individual maintenance'.

3. What is the simplest way of assigning the new cost center to the remaining functional locations in the structure ##?

   a) ***SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location → Change***

      ##

      Organization tab page and enter cost center 4100

      Check the result.

Task 6:

Horizontal Data Transfer

1. Create the functional location structure T## as an overall structure from the reference location structure R## that you created previously.

   How do you proceed?

   a) ***SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location → List Editing → Create***

      Set structure indicator *Gr##*

      Button *Reference model*

      Reference location R##

      New location structure T##

2. Check whether the information from the reference locations has been transferred to the functional locations. Which data is transferred?

   a) Description and Maintenance Data

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Task 7:

Optional exercise for Customer Service

1. Creating Functional Locations

   Call up the function *Create functional location*.

   Select the structure indicator SERV2 and choose *Refresh screen* so that the edit mask and hierarchy levels are displayed correctly.

   Create a functional location with the number **HTEC##** and functional location category **S**.

   Enter the following data:

   Description: **Hitech Corp. Hamburg**

   Create an individual address for the functional location.

Field Name or Data Type	Values
Planning plant:	**1200**
Sold-to party: Customer number	**T-CSD##**
Sales organization:	**1000**
Distribution channel:	**14**
Division:	**00**

   Save the functional location master record.

   a) ***Logistics Customer Service Management of Technical Objects Functional Location Create***

Field Name or Data Type	Values
StrIndicator	*SERV2*

   Refresh

Field Name or Data Type	Values
FunctLocation	*HTEC##*
FunctLocCat	*S*

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Enter

Field Name or Data Type	Values
Description	*Hitech Corp. Hamburg*

Location

Choose the function *Create* in the screen area *Address*.

Enter an address and choose *Copy*.

Organization

Field Name or Data Type	Values
Planning plant	*1200*

Partner

Field Name or Data Type	Values
Role	*SP*
Partner	*Customer T-CSD##*

Sales and distribution

Field Name or Data Type	Values
Sales organization	*1000*
Distribution channel	*14*
Division	*00*

Save

2. Creating Subordinate Functional Locations

   Create a functional location with the number **HTEC##-SHIP**, structure indicator **SERV2** and functional location category **S**.

   Enter your functional location **HTEC##** as a copy model. Copy all the sub-objects proposed.

   Change the description to **Hitech Hamburg Shipping Center**.

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Which functional location is proposed as the superior functional location based on the functional location number entered?

a) ***Logistics Customer Service Management of Technical Objects Functional Location Create***

Field Name or Data Type	Values
FunctLocation	*HTEC##-SHIP*
Structure Indicator	*SERV2*
FunctLocCat	*S*
Copy from functional location	*HTEC##*

Enter

Confirm the following dialog box using *Continue*.

Field Name or Data Type	Values
Description	*Hitech Hamburg*
Structure	*Shipping center*

Functional location **HTEC##** is proposed as the superior functional location.

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Lesson Summary

You should now be able to:

- Enter complete location structures quickly
- Use data transfer
- Use reference locations

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Lesson: Alternative Labeling

Lesson Overview

This lesson shows how to change the primary label of a functional location.

Lesson Objectives

After completing this lesson, you will be able to:

- Create alternative labels
- Work with alternative labeling systems

Business Example

The system engineer accidentally entered a functional location with an incorrect label. You want to correct it without making a new entry.

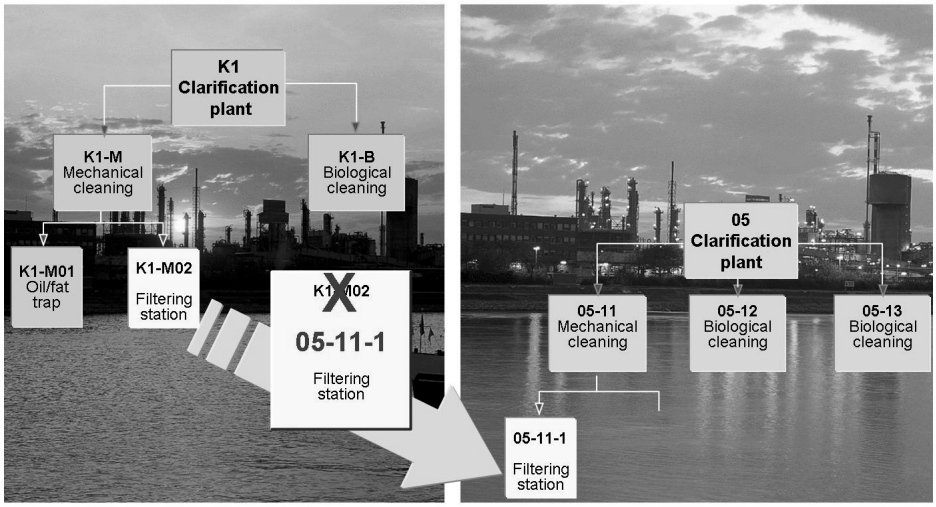

Figure 19: Alternative Labeling of Functional Locations I

In alternative labeling of functional locations, you can change labels for functional locations.

This change can contain the “renumbering” of a functional location, that is, changing the primary key, or the definition of an additional view that displays the object using a different numbering scheme.

When the primary label is changed, you are asked whether the renumbered functional location should be classified in a new hierarchy (if available).

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Important note:

The alternative labeling must be activated in Customizing. It is not active in the standard system. It should be comprehensively tested before being used, since it can affect system performance.

To optimize performance, the report RI_IFLOT2IFLOS (using transaction SE38) should be executed after the alternative labeling has been activated.

You can also deactivate alternative labeling again. However, the system is not reset to its initial status before the activation. In certain cases, this may lead to poorer system performance.

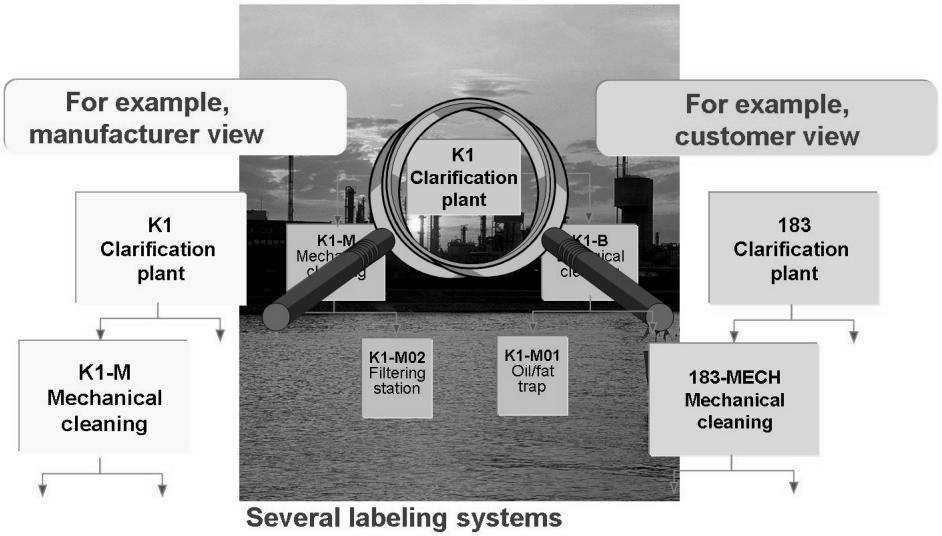

Figure 20: Alternative Labeling of Functional Locations II

The **alternative labeling** of functional locations enables you to use different labeling systems for the same hierarchy. For example, the manufacturer of a technical system can work with a labeling system that is different from the one used by the customer.

Although **alternative labeling systems** are available through an internal **structure indicator**, they do not affect the structure of the object. The structure is determined by the **primary labeling system**.

The labeling system is defined in Customizing. The selection of the appropriate labeling system is controlled by a **user profile**, in which the required views can be created and activated.

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Exercise 2: Alternative labeling

Exercise Objectives

After completing this exercise, you will be able to:

- Change the primary label of a functional location and define alternative views

Business Example

The system engineer accidentally entered a functional location with an incorrect label. You want to correct it without making a new entry.

Task:

Alternative labeling (changing the primary key)

The waste water measurement in the intake pumping station in your clarification plant ## is being relocated to your pumping station ##-B01. You want to use alternative labeling to do this.

1. What steps do you have to perform in Customizing?
2. Assign the new primary label ##-B01-3 for your waste water measurement and reassign the functional location in the structure. How do you proceed?
3. Check whether the functional location was reassigned.

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Solution 2: Alternative labeling

Task:

Alternative labeling (changing the primary key)

The waste water measurement in the intake pumping station in your clarification plant ## is being relocated to your pumping station ##-B01. You want to use alternative labeling to do this.

1. What steps do you have to perform in Customizing?

   a) You must activate the alternative labeling for functional locations.

2. Assign the new primary label ##-B01-3 for your waste water measurement and reassign the functional location in the structure. How do you proceed?

   a) ***SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location→ Change***

   Call up functional location ##-ZPW-3.

   ***Extras -> Alternative Labeling -> Overview*;**

   Select the label "IDES AG" and choose the "Change label" button.

   Enter the new number ##-B01-3 and confirm.

   Confirm the pop-up query whether the functional location should be assigned.

3. Check whether the functional location was reassigned.

   a) ***SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location → Structural Display***

   Display ##-B01

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Lesson Summary

You should now be able to:

- Create alternative labels
- Work with alternative labeling systems

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Unit Summary

You should now be able to:

- Enter complete location structures quickly
- Use data transfer
- Use reference locations
- Create alternative labels
- Work with alternative labeling systems

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Unit 2

Equipment

Unit Overview

This chapter builds up on the chapter *Technical Objects* in the course PLM300, recapitulates the term and concept of equipment and then expands on the application of equipment with a whole range of detailed functions and their related Customizing settings.

Unit Objectives

After completing this unit, you will be able to:

- Identify the usage options for equipment
- Create and maintain equipment master records
- Make all the necessary Customizing settings for equipment categories
- Classify pieces of equipment
- Search for pieces of equipment using the classification

Unit Contents

Lesson: Using Equipment 40
Exercise 3: Using Equipment 57
Lesson: Classification 78
Exercise 4: Classification 83

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Lesson: Using Equipment

Lesson Overview

This lesson shows you the various options for using equipment.

Lesson Objectives

After completing this lesson, you will be able to:

- Identify the usage options for equipment
- Create and maintain equipment master records
- Make all the necessary Customizing settings for equipment categories

Business Example

The project team wants to represent important and expensive individual pieces of machinery such as pumps and motors, and decides to use equipment to represent them.

Usage Options

Equipment is used to represent independent central individual objects for which a history is to be created for the purposes of Plant Maintenance or Customer Service.

Equipment can be independent individual objects (such as a tools, vehicles etc.) or an installed aggregate at a functional location (such as a pumps, motors, or gears).

The most important assigning criterion is the **equipment category**. It is used to define, describe and control objects that are fundamentally different (for example, machines, fleet objects, production resources/tools, customer equipment).

The **equipment category** contains all central Customizing settings:

- Views in Master Record
- History
- Installation Specification
- Change Update
- User Status
- Partner

The following sections provide examples of the various areas in which equipment can be used:

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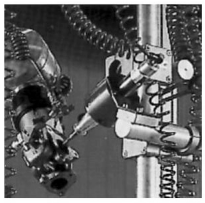
Equipment category: Machine



Equipment category: Production resources and tools

Equipment category: Fleet object

Equipment category: Measuring and test equipment

Figure 21: Independent Single Equipment

To structure equipment categories in greater detail, you can use the **object type** (also for functional locations).

Example:

Equipment type: Fleet object

Object types: Car, truck, motorbike and so on

In some cases, special views can be added to the master record in addition to structuring by equipment category and object type, for example, for production resources/tools and fleet objects.

Production resources and tools: A production resource/tool (PRT) is a moveable operating resource (such as a tool or a measuring device) used in Plant Maintenance and Production. PRTs can be pieces of equipment, materials or documents and are assigned to the operation within the maintenance order. You can make status checks, availability checks, and usage overviews in maintenance processing.

Production resources/tools have an additional view PRT Data, in which you can make entries about task list usage or set the status of the production resources/tools to Locked.

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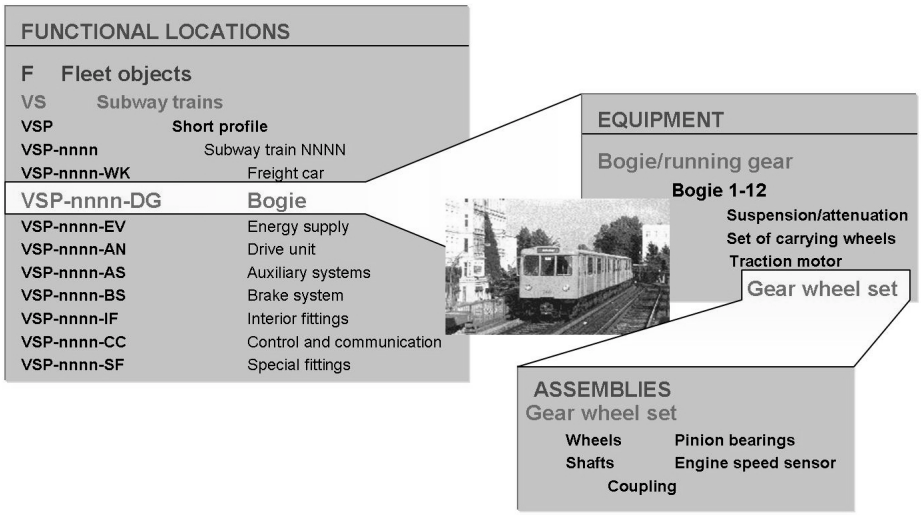

Figure 22: Equipment and Functional Location

The combination of hierarchical system or object structure and the autonomous object view represents the **installation of a piece of equipment at a functional location**.

The installation location of an object/aggregate and the installed object itself can be represented separately in the system. This differentiation allows a separate tracking of damages, that is, documenting whether the damage stems from the conditions at the installation location (= functional location) or perhaps from the inferior quality of the installed object (= object). In this case, the cause of damage would either be updated to the functional location or the piece of equipment.

The usage times can be recorded from the equipment view (= where was the equipment installed) and the functional location view (= which pieces of equipment were installed at this functional location).

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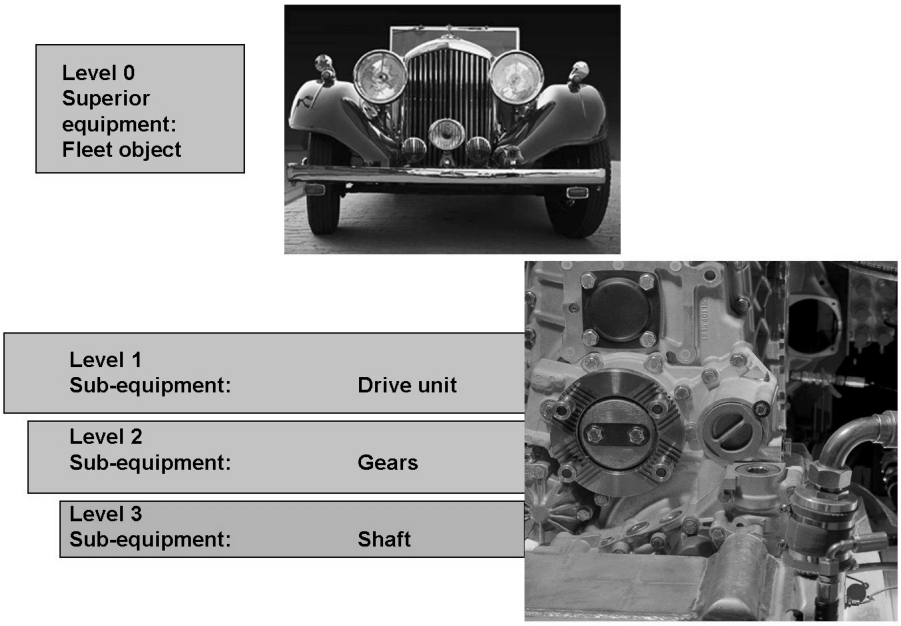

Figure 23: Autonomous Equipment Hierarchy

You can use equipment hierarchies if the use of functional locations is not supported in your company or individual moveable aggregates have a complex structure.

The equipment hierarchy differs from a functional location hierarchy in that it is not controlled by a structure indicator, so no relationship exists between the equipment numbers in a hierarchy. Moreover, in the Plant Maintenance Information System, costs cannot be summarized at the level of the top equipment for the hierarchy beneath.

Equipment hierarchies can be structured to suit individual requirements. In contrast to the installation at the functional location, there are no installation specifications for installing in another piece of equipment, in other words, pieces of equipment that shall not be installed at a functional location can be installed in another piece of equipment.

Data transfer from the superior equipment to the subordinate equipment equates with data transfer from the functional location to the equipment (see topic *Data Transfer* in the unit on *Functional Locations*).

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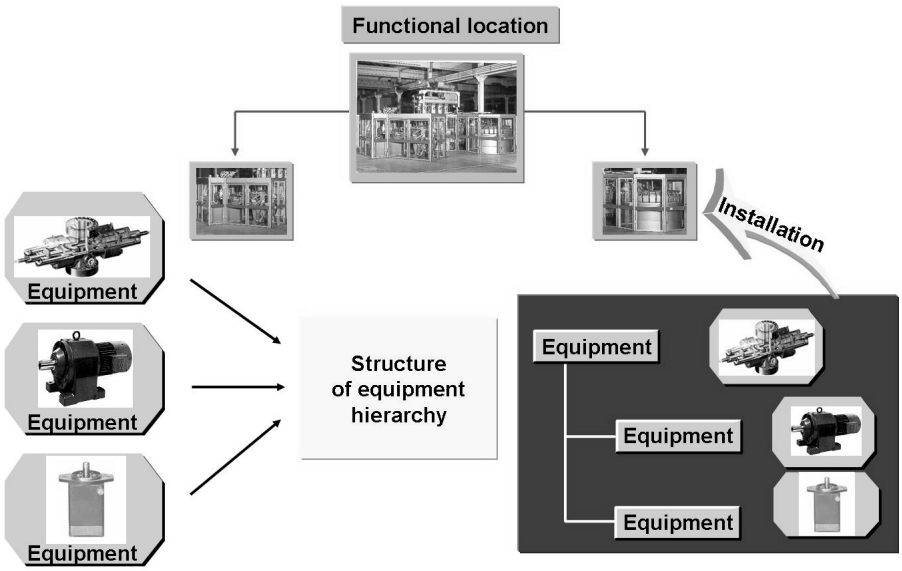

Figure 24: Equipment Hierarchy and Functional Location

You can install equipment hierarchies, similar to individual pieces of equipment, at functional locations. Data is transferred according to the same principle as between functional locations and pieces of equipment or for equipment hierarchies.

If the equipment usage periods are displayed at the functional location, the pieces of equipment and entire hierarchy can be seen at the top of an equipment hierarchy.

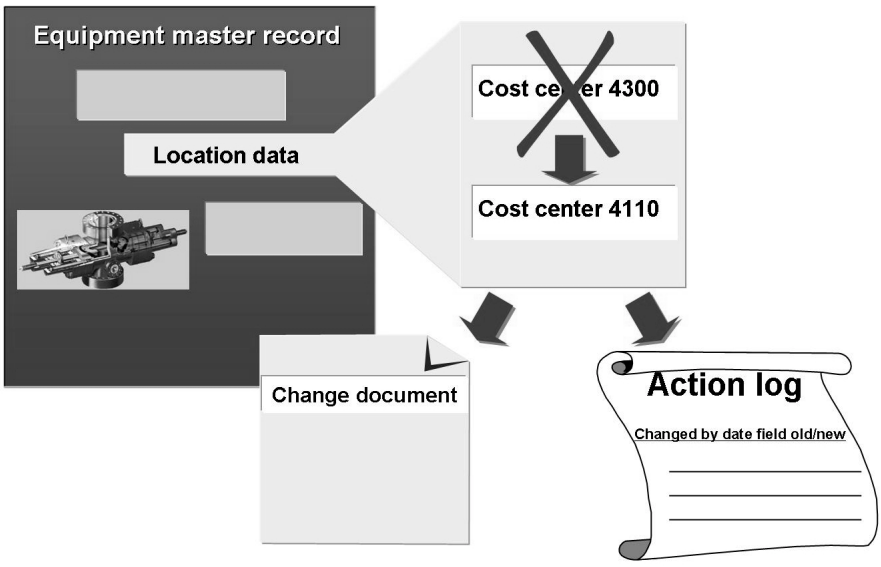

Figure 25: Documenting Changes

Changes to master records are documented as a change document. Each change is recorded in a separate document and contains a document number.

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Status Management

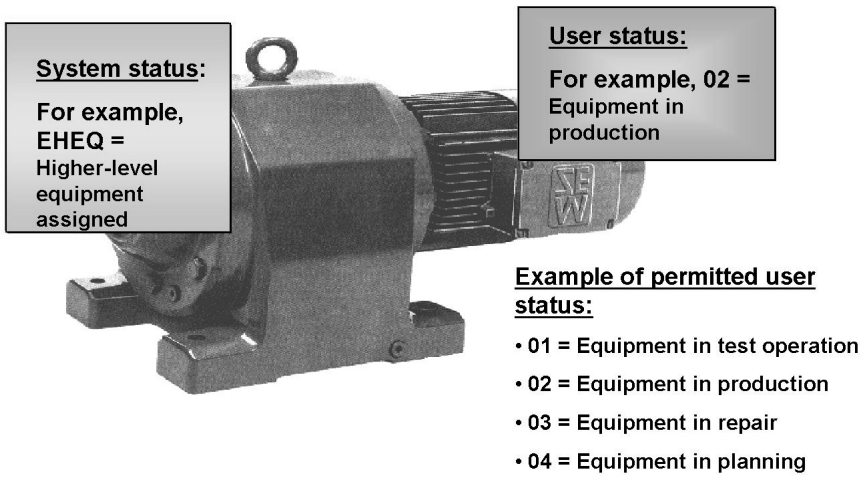

Figure 26: System Status and User Status

You can use status management to describe and ascertain whether or not a technical object is available for particular operations. There are two different types of status:

- System status
- User status

System statuses are set internally by the system for particular business transactions within general status management. They inform you whether a particular business transaction has been performed at a technical object, and which business transactions you may now perform for the technical object based on this status.

Since the system statuses cannot be changed directly by the user and are set automatically by the system when you perform particular business transactions, you are only able to display them.

User statuses are defined by the system user within a status profile. You can use a status profile to limit the business transactions allowed for the respective system statuses.

You can assign and delete user statuses defined in Customizing if you have the appropriate authorization for this. Combine the statuses you require as a **status profile** and assign this profile to the object category (and therefore to the equipment category).

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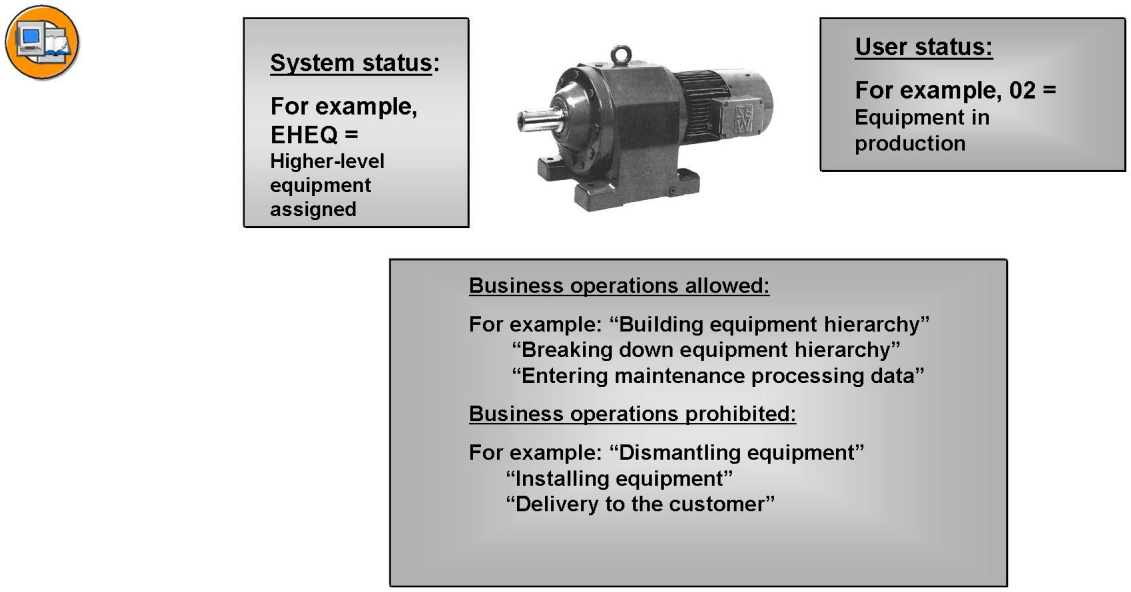

Figure 27: Business Operations

Partners and Addresses

Partners (business partners, contact persons) are internal or external organization units that could be involved in the development of maintenance or service measures.

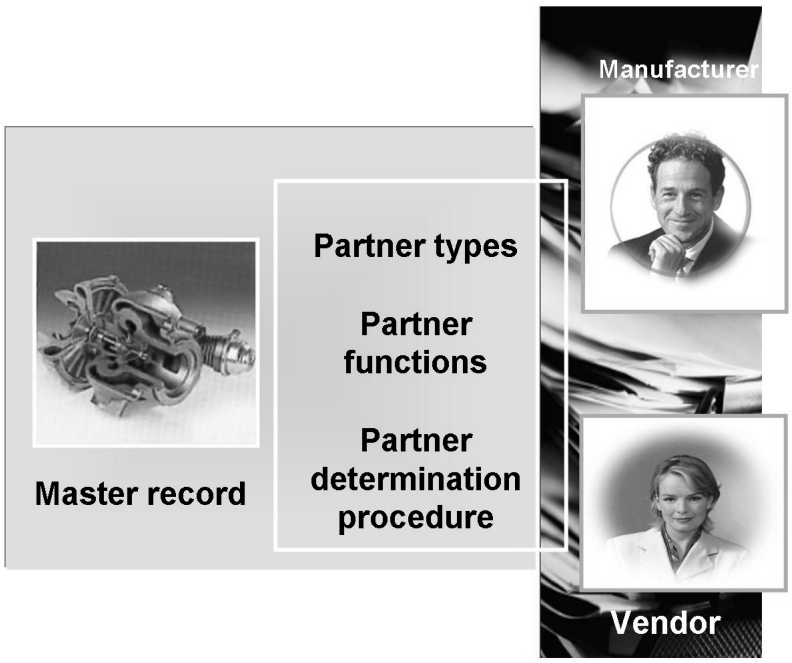

Figure 28: Partners in the Technical Object

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Partner types

Personnel numbers, SAP users (internal)

Customers, vendors (external)

You can use non-standard **partner types** using customer exit ICSV0008. The partner types supported in the standard system are customer, vendor, contact person, personnel number, user, job and organizational unit.

Partner functions

The different partner types can be subdivided according to partner functions. The partner function defines a partner's rights, obligations, responsibilities and tasks during the processing of a business transaction. In most cases, the partner fulfills predefined functions. This means that you only need one master record for this partner. In other cases, partner functions are divided up among different companies and their subsidiaries.

Partner determination procedure

The partner determination procedure is a grouping of partner functions that specifies whether partners are allowed for a particular object and which partner functions are possible for performing business transactions. The partner determination procedure is assigned to the functional location or equipment category.

If a technical object has a partner determination procedure, the partners in this partner determination procedure can be assigned to the object.

If a notification or an order is entered for the technical object with a partner, the system transfers the partner from the technical object to the notification or order.

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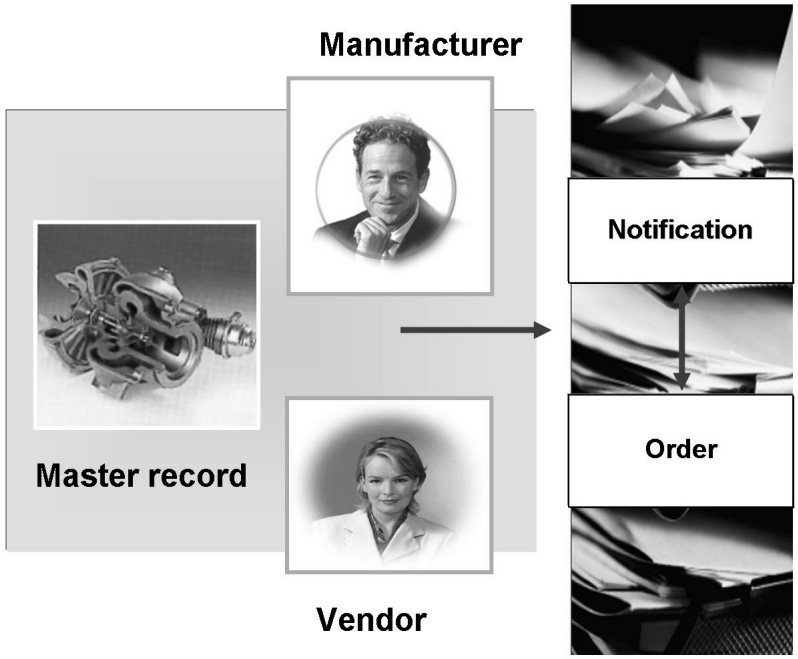

Figure 29: Partner Transfer

Transfer of partner data to the serial number: During a delivery, partner data is automatically transferred from the delivery note to the serial number master record when goods issues are posted. The system copies the partner data from the SD document to the master record for the serial number. If partner data has already been specified in the master record for the serial number, this data is overwritten by the data from the SD document. However, the system only overwrites partner data for which an indicator has been set in Customizing.

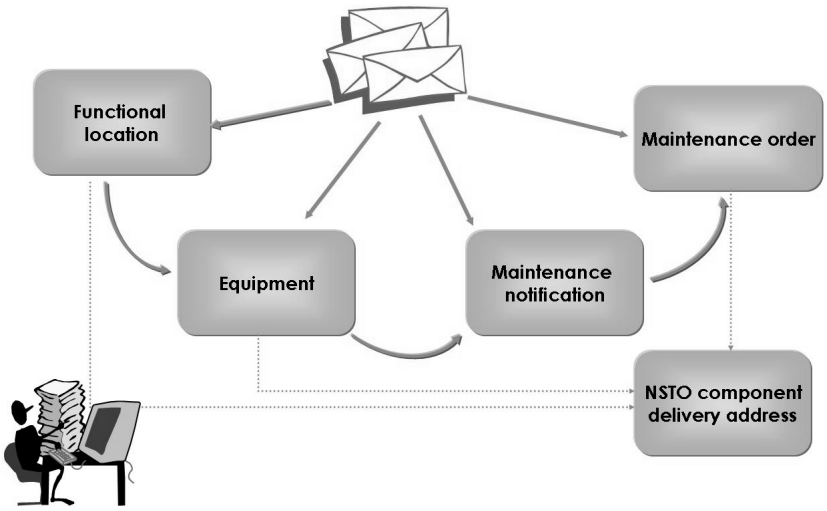

Figure 30: Central Address Management

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The following objects are linked to the address management:

- Functional location
- Equipment
- Notification
- Order
- Components for non-stock material (order)

You can assign an address to all technical objects. The addresses of the technical objects, notification and order are synchronized.

Warranties

A warranty is a binding commitment to the customer to provide services, partly or fully without cost, for a specified period of time, or for the specific life of an individual device.

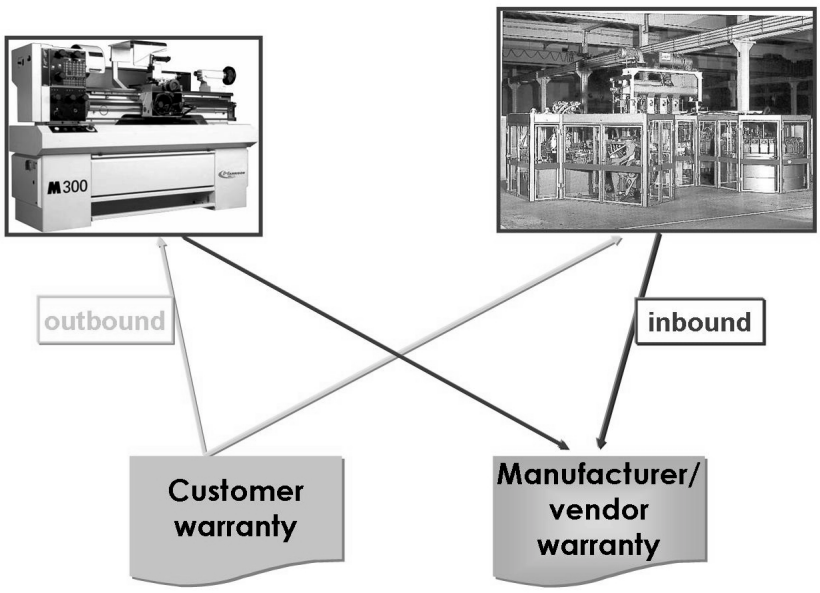

Figure 31: Customer Warranty and Manufacturer/Vendor Warranty

Before you create a warranty record, you must define how the warranty should be used. For this, you need the **warranty type**. The warranty type is assigned to an internal **warranty category** that specifies whether the company for which the system user works is a **warrantee** or **guarantor**.

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In the SAP System, a distinction is made between the following warranty types from the view of the system user:

- Manufacturer warranty (Warrantee – inbound)
- Vendor warranty (Warrantee – inbound)
- Customer warranty (Guarantor – outbound)

A series of standard table entries are already provided in the SAP System. In Customizing, you can define the different warranty types that are still needed in your company, and assign each warranty type to one of the two warranty categories. If you create a warranty record as a system user, you must use one of the existing warranty types.

Warranties can initially be created as master warranties, independently of the reference object.

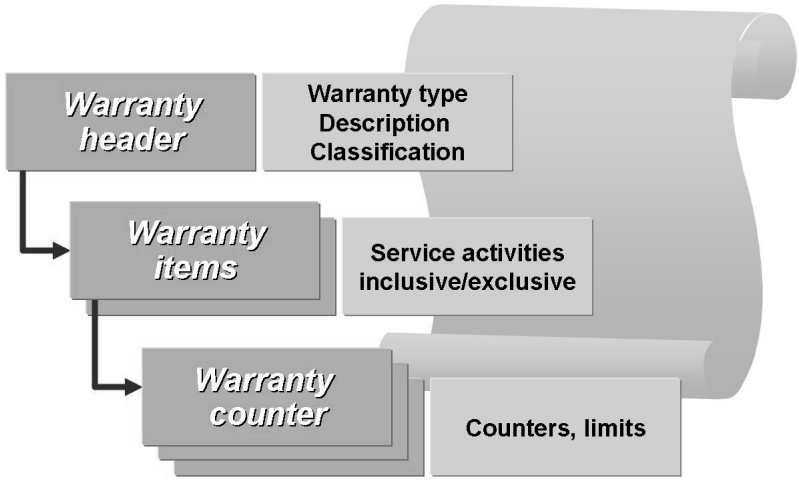

Figure 32: Master warranty

A master warranty is structured as follows:

The **warranty header** contains the warranty type, descriptive text and option of classification.

The **warranty items** contain the services that are included or not included in the warranty. The services can be described using a text, service number or material number. Configurable services can be assigned values in the warranty.

Warranty counters can be defined for each warranty item. These are validity criteria that are defined as a period of time or a performance counter. The warranty counters can either be linked using an AND link (both of the conditions must be met) or an OR link (one of the conditions must be met).

A master warranty can be assigned to any number of pieces of equipment.

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Warranties can now be assigned to functional locations, equipments and serial numbers.

The system supports two warranty types per object. You can now assign a customer warranty and vendor warranty to each object. In the event of damage, both warranties will be checked.

Warantee: The warranty comes from an outside party, for example, from a vendor or manufacturer. The observer is the warrantee.

Guarantor: The warranty is internal and goes to the customer. The observer is the guarantor.

Additional Functions

To assign pieces of equipment to an asset, you can define an asset number in the equipment master record. This establishes the integration to **Asset Accounting**.

If integration between asset accounting and plant maintenance is activated in Customizing, equipment can be created automatically when creating a technical system. Asset class settings are used to differentiate various mapping aspects (for example, which equipment type is used)

Alternatively, you can define that an asset is created automatically when a piece of equipment is created, or that the asset master record is changed when the equipment master record is changed.

Integration can be realized as direct synchronization or as workflow.

You ensure data consistency in both asset and equipment by defining that fields in the equipment master record must also be updated when changes are made to the asset master record.

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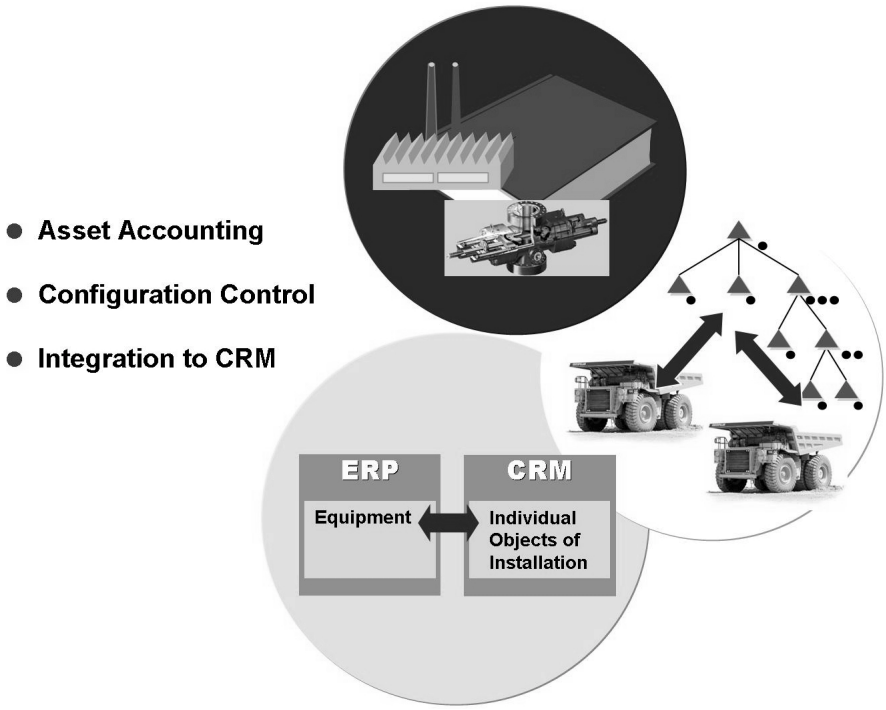

Figure 33: Additional Functions

The **configuration control** allows you to compare the current assembly condition of a technical object with the target condition in order to determine whether the technical object has a valid configuration.

The target configuration is based on the **Illustrated Parts Catalog (IPC)** of the manufacturer and is represented in the SAP System by the **Master Parts List**. The Master Parts List is technically implemented by the **Integrated Product and Process Engineering (iPPE)**.

The maintenance always has to be carried out in accordance with the IPC, which means that only IPC-approved (spare) parts can be installed in the technical object.

The **actual configuration** is the current hierarchy structure of a technical object and can consist of functional locations, pieces of equipment and bills of material.

Due to the link between the target configuration and the actual configuration, you can compare both conditions within the configuration control. This enables you to validate a given technical structure at any time.

You can achieve the **integration to CRM** by replicating equipment from SAP ECC to SAP CRM.

The pieces of equipment from SAP ECC are then represented as individual objects of an installation in SAP CRM. The equipment number in ERP then corresponds to the object ID in CRM. If the pieces of equipment are subject to a structure, this structure is represented as a hierarchy in the installation. You can also activate upload functions, with which you can transfer changes in SAP CRM to SAP ECC.

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SAP ECC is the leading system for creating new equipment, which means that a creation of individual objects of the object family in SAP CRM does not result in a creation of equipment in SAP ECC. You need to differentiate here between the following:

- **Initial load:** The initial data load is performed with the initial load. You can repeat the initial load as many times as you want because the existing data in SAP CRM is overwritten.
- **Permanent load:** The permanent transfer of newly created equipment in SAP ECC (usually after the initial load) to SAP CRM is performed with the permanent load.

You must first activate the equipment data transfer. Note the following individual steps:

- Step 1: Harmonize the product hierarchy settings
- Step 2: Settings for the equipment replication
- Step 3: Activate the BAdI implementation
- Step 4: For additional uploads: activate adaptor objects

BAPIs, BADIs and Customer Exits

Examples:

- **BAPI_EQMT_CREATE**
  Create a piece of equipment
- **BAPI_EQMT_DETAIL**
  Read details for equipment
- **BAPI_EQMT_DISMANTLEFL**
  Dismantle equipment at functional location
- **BAPI_EQMT_DISMANTLEHR**
  Dismantle equipment from equipment hierarchy
- **BAPI_EQMT_GETCATALOGPROFIL**
  Determine catalog profile for equipment

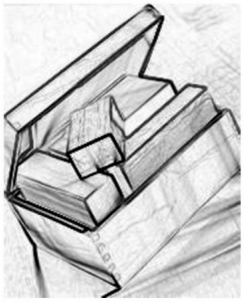

Figure 34: Business Application Programming Interfaces (BAPIs)

Definition of BAPI:

BAPIs are standardized, stable interfaces (methods) that enable you to access SAP business objects and thereby represent an important option for integrating the SAP System with external systems.

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For example: An instance (a concrete object) of the SAP business object **Equipment** should be created in an SAP system from an external program. To do this, the external program would call up the BAPI "BAPI_EQMT_CREATE" and create a concrete piece of equipment.

You can display all the BAPIs available in the ERP System with all relevant details using the BAPI Explorer (transaction BAPI).

- **Customer Exits**
  - **For example, IEQM0007: Checks/changes to the manufacturer field in equipment master record**
- **BAdIs**
  - **For example, EQUI_UPDATE: Equipment master data**

Figure 35: Customer Exits

Enhancements represent potential customer requirements that are not met in the standard system. They are possible in the SAP Standard and can be arranged for customers with customer-specific logic. The upward compatibility is ensured, which means that the call of an enhancement from the standard software and the validity of the call interface will remain in future releases.

Customer exits allow customers to add customer-specific functions to the SAP Standard applications within the SAP enhancement concept. Customer exits themselves do not have any functions, but are program exits that enable you to include user-defined programs.

There are two main advantages to customer exits:

- They have no effect on the SAP standard source text.
- They are not affected by software updates.

For example: When you save an equipment master record, the *Manufacturer* field should be checked and if necessary re-read from an external table independently of the equipment category and description. Customer exit **IEQM0007** is used for this in conjunction with a user-defined program, which performs the check and comparison with the external table.

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Business Add-Ins (BADIs) represent a new enhancement technology with additional functions compared to customer exits. As for customer exits, the required logic can be arranged in the implementation view without modifying the original object. The upward compatibility is also ensured for interfaces of a Business Add-In, which means that the call of an enhancement from the standard software and the validity of the call interface remain unaffected by the change of release.

In contrast to customer exits, Business Add-Ins assume the use of a multiple level (SAP,country versions, IS solutions, partners, customers etc.) and not just a two-level (SAP, customer) system landscape. You can create definitions and implementations of Business Add-Ins at every level of the system landscape.

For example: After you save a piece of equipment, you can use the Business Add-In (BAdI) **EQUI_UPDATE** to implement any further processing of the relevant master data, such as data transmission to external systems.

Customizing Equipment

- **Equipment categories**
  - **Category**
  - **Number range**
  - **Business views**
- **View profile**
- **Usage history**
- **Object types**
- **Installation at functional location**
- **Status profile**
- **Partner**
- **Field selection for equipment master record**
- **Integration with Asset Accounting**

Figure 36: Customizing Settings for Equipment

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Exercise 3: Using Equipment

Exercise Objectives

After completing this exercise, you will be able to:

- Create a new equipment category with the associated settings

Business Example

Individual objects for which maintenance tasks should be recorded are represented as pieces of equipment in the enterprise. Different equipment categories should be introduced for machines, pumps, vehicles and so on, to ensure optimal setting of parameters.

Task 1:

A new equipment category for pumps is required.

First check the equipment categories available in Customizing and use a free number from 1 - 9 or letter from A - Z.

Create a new equipment category with the name **`Pump group##`**.

1. How do you proceed?

   Which equipment category have you created?

2. Make the required entries so that change documents are created for the new equipment category and you can obtain object information using the PM key.

   How do you proceed?

3. Assign the new equipment category to the number range that already exists in the system.

   How do you proceed?

   What options do you have for number assignment?

4. Use the relevant Customizing option to create a view profile **`Gr##`** that contains the following views:

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Tabstrip	Contents
General	General and manufacturer data, reference data, address
Organization	Location data, account assignment data, areas of responsibility
Structure	Structuring, classification (standard class - part of screen)
Additional data 1	Partners, guarantees, documents (part of screen)

The *Additional data 1* tab page should be given an appropriate name or a graphic symbol.

How do you proceed?

5. Assign the view profile (created above) to your equipment category.

   How do you proceed?

6. Which business views can you activate in addition to the view profile?

7. Allow this equipment category to be installed at the functional location. In addition, define that the usage history be updated when changes are made to the master record.

   How do you do this?

8. Create a new equipment master record **`TET-##`** using the newly created equipment category.

   Enter the following data:

Field name or data type	Values
Maintenance plant	1000
Object type	1000 (water supply pump)
Manufacturer	Merged pump plants
Manufacturer serial no.	12345-6
Category description	XY-0815
Year of construction	2004
Cost center	4300

   Where do you make these entries?

9. Install your new equipment **`TET-##`** at pump station **##-B01-1**.

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What requirements must be met for a piece of equipment to be installed?

What system status does the equipment have before being installed?

First install the equipment with data transfer from the functional location and copy all the functional location data. How do you proceed?

What system status does the equipment have after being installed?

To which cost center does the equipment belong after it has been installed?

Display the structure of pump station ##-b01 with the installed equipment. How do you proceed?

Task 2:

Status Management

1. Display the partner determination procedure **PMSTAT** in Customizing.

   Which statuses are maintained?

   How is the status control regulated?

   Which business management operations are still allowed for the status *scrapped*?

2. Assign the status profile PMSTAT to the category of your piece of equipment.

   How do you proceed?

Task 3:

Partners and Addresses

1. Display the partner determination procedure **PM** in Customizing.

   Which functions have been defined?

2. Assign the partner determination procedure **PM** to the category of your piece of equipment **TET-##**.

   How do you proceed?

3. Assign vendor **1000** as the responsible vendor and user **PLM305-##** as the responsible user to your piece of equipment **TET-##**.

   How do you proceed?

Task 4:

Optional exercises for Customer Service

1. Creating Customer Equipment

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Create a piece of equipment with the number **EQUI1##** and equipment category **S**.

Enter the following data:

Description	**Printer**
Planning plant	**1200**
Sold-to party	Customer number **T-CSD##**
Sales organization	**1000**
Distribution channel	**14**
Division	**00**

Save the equipment master record.

2. Creating a Subordinate Piece of Equipment

   Create a piece of equipment with the number **EQUI2##** and equipment category S. Enter your equipment **EQUI1##** as a copy model.

   Copy all the sub-objects proposed.

   Change the description to **Printer Control Unit**.

   Create an equipment hierarchy by assigning this piece of equipment to the superior equipment **EQUI1##**.

   What system status does the equipment have following this installation?

   Save the equipment master record.

3. Install customer equipment

   Change your equipment **EQUI1##** and install it at the functional location **HTEC##-SHIP**.

   Hint: If you have not already created the functional location **HTEC##-SHIP**, you may alternatively create the functional location **1171-ADMI-0001**. Use *Hitech Management* (or other areas in this structure).

4. Displaying the Technical Object Structure

   Call up the structural display for the functional location HTEC##.

   Display four levels below. Display the functional location hierarchy, installed pieces of equipment and equipment hierarchy.

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Solution 3: Using Equipment

Task 1:

A new equipment category for pumps is required.

First check the equipment categories available in Customizing and use a free number from 1 - 9 or letter from A - Z.

Create a new equipment category with the name **`Pump group##`**.

1. How do you proceed?

   Which equipment category have you created?

   a) ***SAP Menu → Tools → Customizing → IMG → Execute Project***

   Button *SAP Reference IMG*

   Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Categories → Maintain Equipment Category

   Button *New Entries*

Field name or data type	Values
Cat	For example, A
RefCat	Machines
Equipment category description	Pump group ##
A (no alphanumeric equipment numbers)	Not active
C (change documents should be written)	Not active
WFE (workflow event)	Not active
Object info	No entry
View profile	No entry

2. Make the required entries so that change documents are created for the new equipment category and you can obtain object information using the PM key.

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How do you proceed?

a) ***SAP Menu → Tools → Customizing → IMG → Execute Project***

Button *SAP Reference IMG*

Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Categories → Maintain Equipment Category

Field name or data type	Values
Cat	For example, A
RefCat	Machines
Equipment category description	Pump group ##
A (no alphanumeric equipment numbers)	Not active
C (change documents should be written)	✓
WFE (workflow event)	Not active
Object info	PM
View profile	No entry

3. Assign the new equipment category to the number range that already exists in the system.

How do you proceed?

What options do you have for number assignment?

a) ***SAP Menu → Tools → Customizing → IMG → Execute Project***

Button *SAP Reference IMG*

Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Categories → Define Number Ranges

Button *Maintain groups*

Options for number assignment:

Select available group again, button *Maintain* (pencil) → two intervals are displayed on *Maintain Number Range Intervals* screen, the second of which has the indicator for external numbering, that is, both **internal** and **external** number assignments are available for your equipment category

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4. Use the relevant Customizing option to create a view profile **Gr##** that contains the following views:

Tabstrip	Contents
General	General and manufacturer data, reference data, address
Organization	Location data, account assignment data, areas of responsibility
Structure	Structuring, classification (standard class - part of screen)
Additional data 1	Partners, guarantees, documents (part of screen)

The *Additional data 1* tab page should be given an appropriate name or a graphic symbol.

How do you proceed?

a) ***SAP Menu → Tools → Customizing → IMG → Execute Project***

Button *SAP Reference IMG*

Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → General Data → Set View Profiles for Technical Objects

Button *New Entries*:

Field name or data type	Values
Screen grp	Screen group – equipment data
Profile	Gr##
Des. Profile	For example, view profile for group ##

ENTER and select line, then in column *Dialog Structure* double click on line *Activity and layout of views*, then button *New entries*

View *General*

Field name or data type	Values
Number	10
Descriptn	General

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Tab active	✓
Seq. no.	005
Seq. no.	010
Seq. no.	015
Seq. no.	025

View *Organization*

Field name or data type	Values
Number	30
Descriptn	Organization
Tab active	✓
Seq. no.	020
Seq. no.	030
Seq. no.	035
Seq. no.	No entry

View *Structure*

Field name or data type	Values
Number	50
Descriptn	Structure
Tab active	✓
Seq. no.	040
Seq. no.	097
Seq. no.	No entry
Seq. no.	No entry

View *Additional data 1*

Field name or data type	Values
Number	60
Descriptn	Additional data 1
Tab active	✓
Seq. no.	100

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Seq. no.	110
Seq. no.	122
Seq. no.	No entry

5. Assign the view profile (created above) to your equipment category.

   How do you proceed?

   a) ***SAP Menu → Tools → Customizing → IMG → Execute Project***

      Button *SAP Reference IMG*

      Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Categories → Maintain Equipment Category

Field name or data type	Values
Cat	For example, A
RefCat	Machines
Equipment category description	Pump group ##
A (no alphanumeric equipment numbers)	Not active
C (change documents should be written)	✓
WFE (workflow event)	Not active
Object info	PM
View profile	Gr##

6. Which business views can you activate in addition to the view profile?

   a) ***SAP Menu → Tools → Customizing → IMG → Execute Project***

      Button *SAP Reference IMG*

      Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Categories → Define Additional Business Views for Equipment Categories

      Other views:

      PRT indicator, SD data, configuration, serial data

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7. Allow this equipment category to be installed at the functional location. In addition, define that the usage history be updated when changes are made to the master record.

   How do you do this?

   a) ***SAP Menu → Tools → Customizing → IMG → Execute Project***

      Button *SAP Reference IMG*

      Plant Maintenance and Customer → Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Usage Period→ Define Installation at Functional Location

Field name or data type	Values
Cat	For example, A
Equipment category description	Pump group ##
RefCat	M (machines)
Inst. at FunctLoc.	✓

      Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects →Equipment → Equipment Usage Period → Usage History Update

Field name or data type	Values
Cat	For example, A
RefCt	Machines
Time seg.	**X**
Equipment category description	Pump group ##

8. Create a new equipment master record **`TET-##`** using the newly created equipment category.

   Enter the following data:

Field name or data type	Values
Maintenance plant	1000
Object type	1000 (water supply pump)
Manufacturer	Merged pump plants
Manufacturer serial no.	12345-6

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Category description	XY-0815
Year of construction	2004
Cost center	4300

Where do you make these entries?

a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment → Create (General)***

Enter number **TET-##**, select category and ENTER

General tab page, *Object type* field and enter **1000**

Location tab page, *Maintenance plant* field and enter **1000**

Organization tab page, *Cost center* field, enter **4300** and save

9. Install your new equipment **TET-##** at pump station **##-B01-1**.

What requirements must be met for a piece of equipment to be installed?

What system status does the equipment have before being installed?

First install the equipment with data transfer from the functional location and copy all the functional location data. How do you proceed?

What system status does the equipment have after being installed?

To which cost center does the equipment belong after it has been installed?

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Display the structure of pump station ##-b01 with the installed equipment. How do you proceed?

a) **Prerequisites for equipment installation:**

1. Equipment installation must be allowed in the master record for the functional location
2. Equipment category must allow an installation

System status before installation: AVLB

Installation:

SAP menu →

Logistics → Plant Maintenance → Management of Technical Objects → Equipment → Change ***Menu bar: Structuring → Change InstallLoc.***

Enter functional location **##-B01-1**, button *Inst. w. Data Transfer*.

→ A dialog box appears which shows the fields that are copied from the functional location or equipment. Button InstallLoc (whole) → → all data is copied from the functional location – use F3 (green arrow) to go back.

System status after installation: **INST**

Cost center after installation: **4110** (the functional location) – the cost center **4300** that was maintained in the equipment to begin with is replaced as a result of the installation.

Display structure of pumping station:

SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location → Structural Display

Enter functional location **##-B01-1** and activate checkbox *Installed equipment* under *Explosion*; execute

Task 2:

Status Management

1. Display the partner determination procedure **PMSTAT** in Customizing.

   Which statuses are maintained?

   How is the status control regulated?

   Which business management operations are still allowed for the status *scrapped*?

   a) ***SAP Menu → Tools → Customizing → IMG → Execute Project***

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Button “SAP Reference IMG”

Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Basic Settings → Define User Status

Position the cursor in the row PMSTAT, and go to “Details”

Field name or data type	Values
UMW	`Equipment environmentally friendly`
PLA	`Equipment in planning`
TST	`Equipment in test operation`
PRD	`Equipment in production`
REP	`Equipment in repair`
DEF	`Equipment defective in the warehouse`
VRS	`Equipment scrapped`

Controlling the status:

With the exception of the status UMW, all statuses have a **status number**. This means that the statuses mutually exclude one another, that is, only one status can be set at any one time. The status UMW can also be set in addition to the normal status.

The **lowest status numbers** are configured in such a way that you cannot switch back to PLA from TST, or from PRD, REP, DEF, VERS to TST. You can switch between PRD, REP, DEF and VERS as you wish.

The **highest status number** is configured in such a way for PLA, for example, that you can only switch upwards to TST.

Allowed business management operations for status VRS

> In the status profile > click twice on the field VRS in the column Status

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Field name or data type	Values
Status VRS (scrapped)	Set deletion indicator Mark for deletion Remove deletion flag Change technical object

2. Assign the status profile PMSTAT to the category of your piece of equipment.

   How do you proceed?

   a) ***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Assign User Status Profile to Equipment Category***

Task 3:

Partners and Addresses

1. Display the partner determination procedure **PM** in Customizing.

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Which functions have been defined?

a) ***SAP Menu → Tools → Customizing → IMG → Execute Project***

Button *SAP Reference IMG*

Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Basic Settings → Partners → Define Partner Determination Procedure and Partner Role

Select the *Plant Maintenance* area using the radio button

Button *Change partner*, then select the row with procedure ***PM*** and double-click on folder *Functions in procedure*

Functions in partner procedure for PM

Field name or data type	Values
AB	`Department Respons.`
SP	`Sold-to party`
Vendor	`Vendor`
MB	`Notif. Process.`
PC	`Position Responsible`
User Responsible	`User Responsible`
VW	`Person Responsible`
SH	`Ship-to party`

2. Assign the partner determination procedure **PM** to the category of your piece of equipment **TET-##**.

How do you proceed?

a) ***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Assign Partner Determination Procedure to Equipment Category***

In the row of the equipment category, enter the partner determination procedure **PM** and save.

3. Assign vendor **1000** as the responsible vendor and user **PLM305-##** as the responsible user to your piece of equipment **TET-##**.

Continued on next page

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How do you proceed?

a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment→ Change***

Goto → Partners

Field name or data type	Values
Function	`Vendor`
Partner	`1000`
Function	`User Responsible`
Partner	`PLM305-##`

Task 4:

Optional exercises for Customer Service

1. Creating Customer Equipment

   Create a piece of equipment with the number **EQUI1##** and equipment category **S**.

   Enter the following data:

Description	**Printer**
Planning plant	**1200**
Sold-to party	Customer number **T-CSD##**
Sales organization	**1000**
Distribution channel	**14**
Division	**00**

Continued on next page

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Save the equipment master record.

a) ***Logistics → Customer Service → Management of Technical Objects → Equipment → Create***

Field name or data type	Values
Equipment	EQUI1##
Equipment category	S

Enter

Field name or data type	Values
Description	Printer

Organization

Field name or data type	Values
Planning plant	1200

Partner

Field name or data type	Values
Sold-to party	Customer T-CSD##

Sales and distribution

Field name or data type	Values
Sales organization	1000
Distribution channel	14
Division	00

Save

2. Creating a Subordinate Piece of Equipment

Create a piece of equipment with the number **EQUI2##** and equipment category S. Enter your equipment **EQUI1##** as a copy model.

Copy all the sub-objects proposed.

Change the description to **Printer Control Unit**.

Continued on next page

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Create an equipment hierarchy by assigning this piece of equipment to the superior equipment **EQUI1##**.

What system status does the equipment have following this installation?

Save the equipment master record.

a) ***Logistics → Customer Service → Management of Technical Objects → Equipment → Create***

Field name or data type	Values
Equipment	EQUI2##
Equipment category	S
Reference equipment	EQUI1##

Enter

Confirm the following dialog box using *Continue*.

Field name or data type	Values
Description	Printer control unit

Choose ***Structure → Change installation location***.

Field name or data type	Values
Superior equipment	EQUI1##

Confirm

The equipment receives the system status *ASEQ* (assigned to superior equipment) following the installation.

Save

3. Install customer equipment

Continued on next page

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Change your equipment **EQUI1##** and install it at the functional location **HTEC##-SHIP**.

Hint: If you have not already created the functional location **HTEC##-SHIP**, you may alternatively create the functional location **1171-ADMI-0001**. Use *Hitech Management* (or other areas in this structure).

a) ***Logistics → Customer Service → Management of Technical Objects → Equipment → Change***

Field name or data type	Values
Equipment	EQUI1##

Enter

Choose the menu path ***Structuring → Change installation location***.

Field name or data type	Values
Functional location	HTEC##-SHIP

Hint: If you have not already created the functional location **HTEC##-SHIP**, you may alternatively create the functional location **1171-ADMI-0001**. Use *Hitech Management* (or other areas in this structure).

Confirm

Save

4. Displaying the Technical Object Structure

Call up the structural display for the functional location HTEC##.

Continued on next page

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Display four levels below. Display the functional location hierarchy, installed pieces of equipment and equipment hierarchy.

a) ***Logistics → Customer Service → Management of Technical Objects → Functional Location → Structural Display***

Field name or data type	Values
Functional Location	HTEC##
Number of levels below	4

Select *Location hierarchy*, *Equipment installed* and *Equipment hierarchy* and then choose *Execute*.

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Lesson Summary

You should now be able to:

- Identify the usage options for equipment
- Create and maintain equipment master records
- Make all the necessary Customizing settings for equipment categories

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Lesson: Classification

Lesson Overview

This lesson shows how you can use classification to assign additional features to a piece of equipment and assign values to them.

Lesson Objectives

After completing this lesson, you will be able to:

- Classify pieces of equipment
- Search for pieces of equipment using the classification

Business Example

The individual objects to be represented have a number of very specific features.

You want to represent them using classification.

Classification System

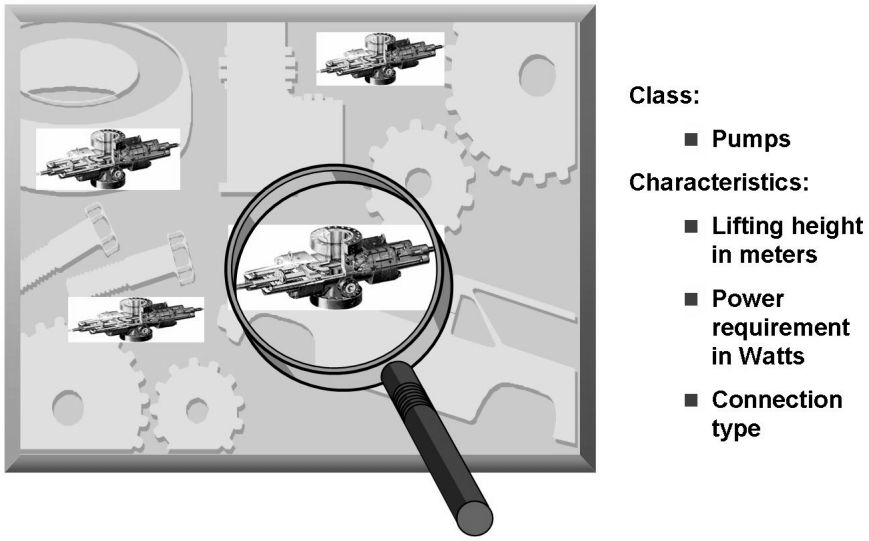

Figure 37: Classifying Technical Objects

Classification is a cross-application function in the SAP System that is used by other applications as well as Plant Maintenance.

One aim of classification is to assign features in detail to a technical object that cannot be assigned to the master record by using the fields of the SAP standard system.

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Classification also provides a very different search option whereby objects can be sought and found according to characteristics and their features. Example: Power requirement = 2,000 Watts AND lifting height = 10 meters AND ...

In order processing, the classification enables you to search for a spare part (for example, a pump with the same features). The system uses the classification data as the basis for the search. In the results list, you can select a component and copy it into the order.

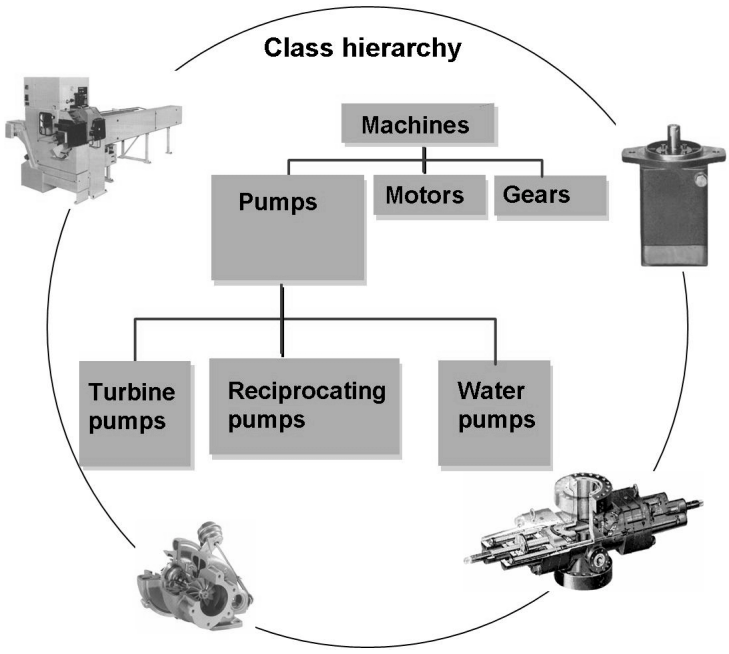

Figure 38: Classification System

A classification system has the task of describing objects using characteristics, and grouping similar objects into classes, to classify them and make them easier to find.

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The structure of a classification system consists of three steps:

1. Defining the features

   First you describe the features of an object using characteristics. You create the characteristics centrally in the SAP system.

2. Creating the classes

   In the second step, the classes are created in the SAP System. When classes are created (or later on, in a separate step), the characteristics are assigned to the classes.

3. Assigning the objects (=classification)

   When you have created the classes required for classification, you can assign objects to these classes. The objects are described using the characteristics contained in the class.

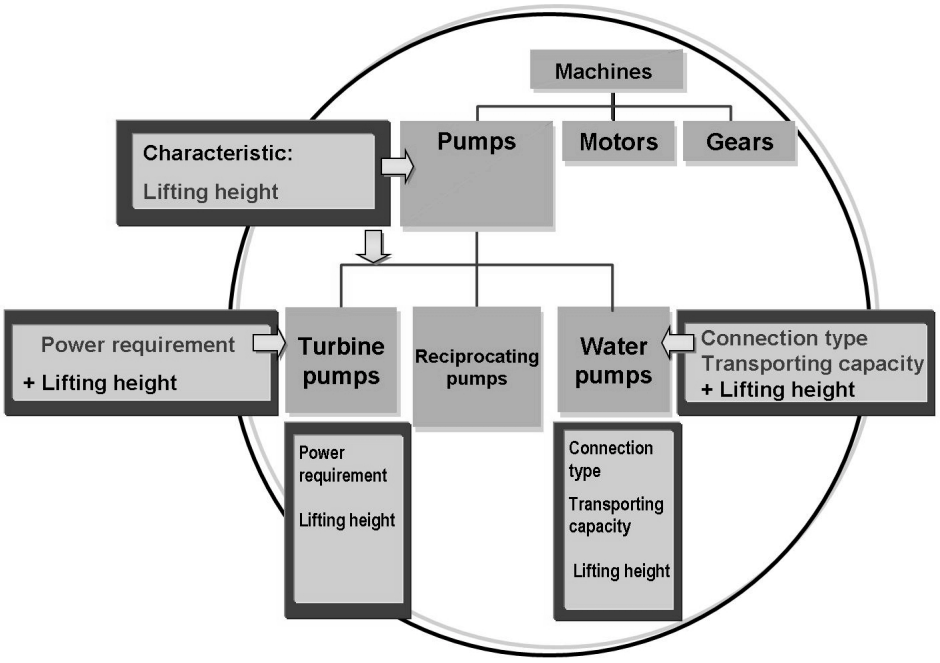

Figure 39: Characteristic Inheritance

Characteristic inheritance is the transfer of a characteristic and all its values into all the subordinate classes of a class hierarchy. The characteristic is therefore not contained in the subordinate classes. Characteristic inheritance enables you to define a central characteristic, which is required in all the subordinate classes, once to a superior class and not have to assign it explicitly to each class.

If you create a class hierarchy, the characteristics for all the superior classes are inherited by the lower classes. Therefore, characteristics that you have not assigned explicitly to the class, but which originate from superior classes, are also displayed on the valuation screen.

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Classifying Pieces of Equipment

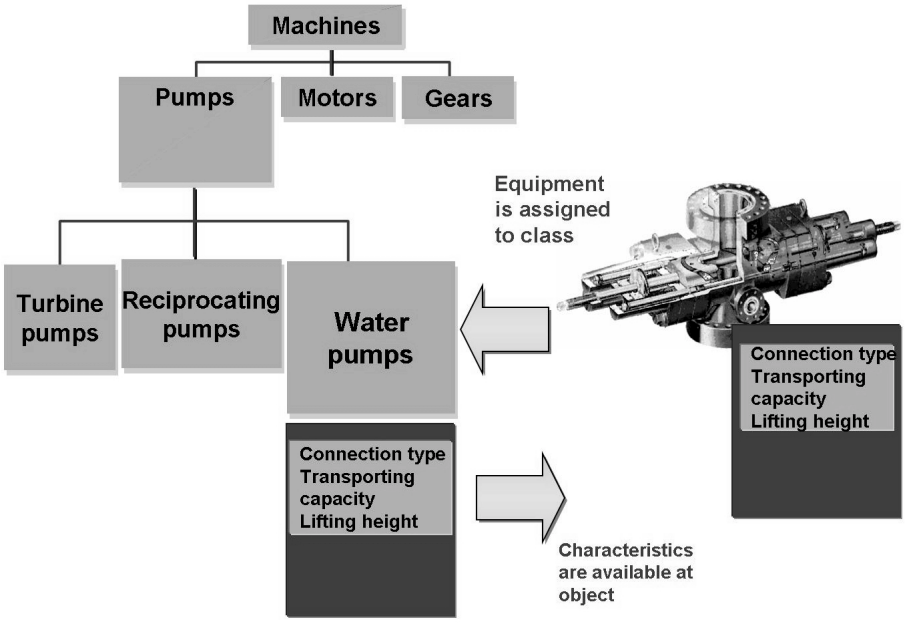

Figure 40: Classifying a Technical Object

A technical object (functional location, equipment) can be assigned to one or more classes using its master record.

If you assign the technical object to more than one class, you can define a standard class.

If the technical object has been assigned to a class, all the characteristics for this class are available at the object, that is, the characteristics can be valued for each object.

A characteristic can be valued manually or automatically. Depending on how the characteristic is controlled, values can either be selected from a list specified in the characteristic or entered freely. In the case of automatic valuation, the characteristic refers to a table field or another characteristic.

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Exercise 4: Classification

Exercise Objectives

After completing this exercise, you will be able to:

- Classify pieces of equipment

Business Example

The individual objects to be represented have a number of very specific features.

You want to represent them using classification.

Task:

Classify your new equipment master record TET-##.

1. Classifying equipment

   Assign your equipment TET-## to class **ED112** and give values to the characteristics ready for input.

   Estimate the running wheel diameter at 910 mm.

   Which characteristics are ready for input and why?

   How are values assigned to the characteristics not ready for input?

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Solution 4: Classification

Task:

Classify your new equipment master record TET-##.

1. Classifying equipment

   Assign your equipment TET-## to class **ED112** and give values to the characteristics ready for input.

   Estimate the running wheel diameter at 910 mm.

   Which characteristics are ready for input and why?

   How are values assigned to the characteristics not ready for input?

   a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment → Change***

      Button *Class overview*, enter class ED112, ENTER, go back using arrow button;

      Tab page *Structure* >the view *Classification* is now displayed;

      The characteristics *category description*, *manufacturer serial number*, *year of construction* and *manufacturer* refer to table fields of the equipment master record and are therefore assigned values automatically.

      The characteristics *rotor diameter*, *output* and *weight* are ready for input because they do not refer to table fields and are therefore not assigned values automatically.

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Lesson Summary

You should now be able to:

- Classify pieces of equipment
- Search for pieces of equipment using the classification

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Unit Summary

You should now be able to:

- Identify the usage options for equipment
- Create and maintain equipment master records
- Make all the necessary Customizing settings for equipment categories
- Classify pieces of equipment
- Search for pieces of equipment using the classification

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Unit 3

Bills of Material

Unit Overview

This chapter builds up on the chapter *Technical Objects* in the course PLM300, recapitulates the term and concept of the maintenance bill of material and then expands on the application of bills of material with a whole range of detailed functions and their related Customizing settings.

Unit Objectives

After completing this unit, you will be able to:

- Describe the BOM structure
- List different BOM categories

Unit Contents

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Exercise 5: Usage of Bills of Material 97

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Lesson: Usage of Maintenance Bills of Material

Lesson Overview

This lesson shows the usage of maintenance bills of material as distinct from bills of material in other company areas.

Lesson Objectives

After completing this lesson, you will be able to:

- Describe the BOM structure
- List different BOM categories

Business Example

Replacement spare parts should be made available for the planning of both larger systems and individual machines.

Revision

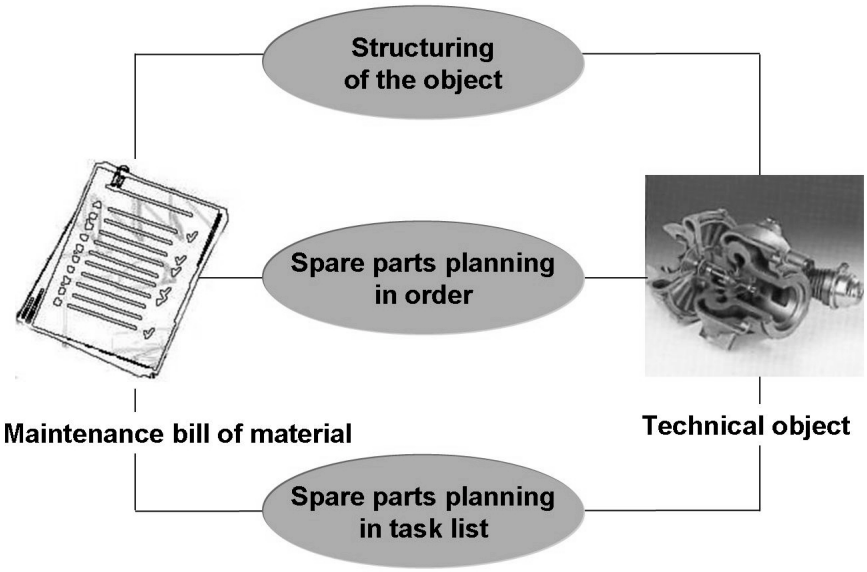

Figure 41: Purpose of the Maintenance Bill of Material

You can use bills of material for different reasons in a company. A distinction is made between different uses, depending on the company area, for example:

The **engineering/design BOM** includes all parts of the product (from an engineering/design perspective) and contains their technical data. It is not usually order-specific.

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The **production BOM** includes items based on production perspectives and assembly statuses. For example, the assembly might only require production-relevant items with process-oriented data.

The **costing BOM** represents the product structure and forms the basis for the automatic determination of material usage costs for a product. Items not relevant for costing are not included in this bill of material.

The **maintenance bill of material (maintenance BOM)** is different from the others because it only contains items relevant to maintenance.

The maintenance bill of material has two main functions:

Structuring the object

An object should be structured as clearly as possible from a maintenance viewpoint.

Spare part planning in the order

If a bill of material is available for a maintenance object, this can be easily used to plan spare parts when planning a maintenance order.

Structure and Usage

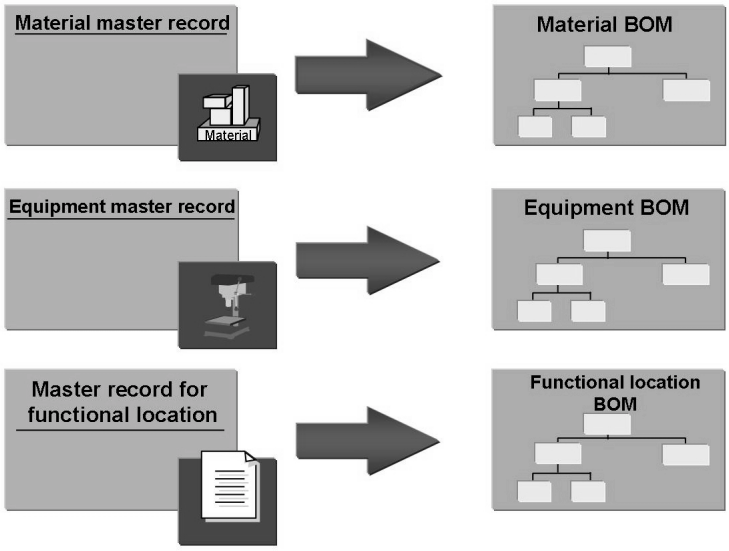

Figure 42: Bill of Material Categories

The material BOM is created with a direct link to a material master record. The material master record includes descriptive data (for example, measurements and weight) and control data (for example, material category and industry). The material BOM contains the individual parts of the object (materials or assemblies).

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The equipment or functional location BOM is used to describe the structure of a piece of equipment or functional location and assign spare parts to it for maintenance.

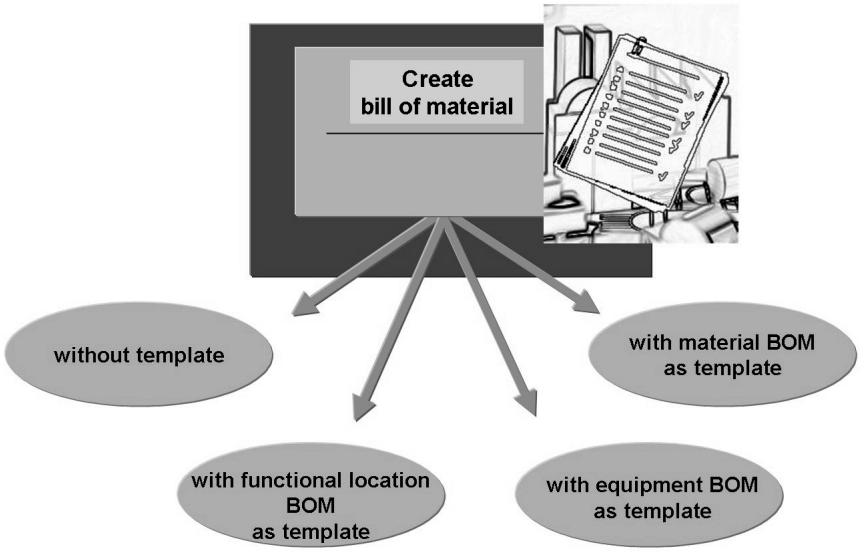

Figure 43: Creating a Bill of Material

You can create all categories of bill of material with or without using a template. If you use a template, the following rules apply for each category:

To create a BOM for a functional location or an equipment BOM, you can use material BOMs, equipment BOMs, and functional location BOMs as a template.

To create a material BOM, you can only use material BOMs as a template.

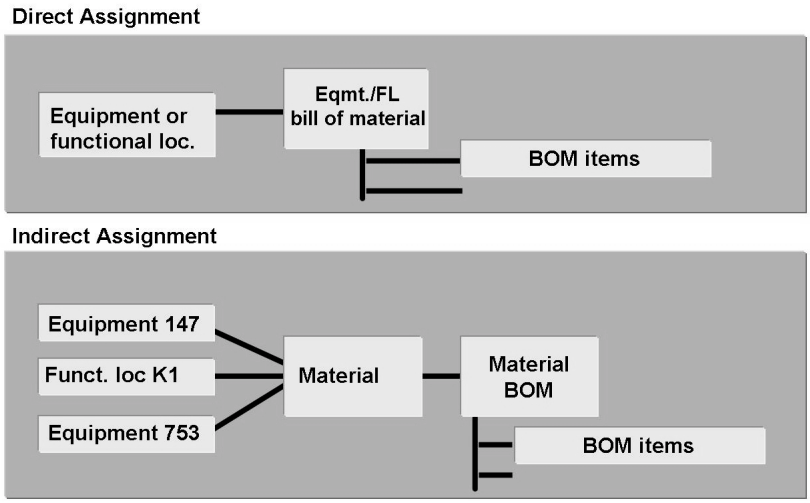

Figure 44: Bill of Material Assignment

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A BOM can be linked with a technical object in two ways: through direct assignment or through indirect assignment.

For direct assignment, a bill of material is created directly for the object (functional location or equipment).

For indirect assignment, you can assign a bill of material to master records for technical objects using a material master record. You make the assignment in the master record for the technical object by entering the material number in the *Construction type* field. The bill of material is dependent on the material and not directly on the technical object. This is advisable if several objects exist for the same construction type: You do not have to create an equipment BOM for each individual object - all objects of the same construction type use the same material BOM.

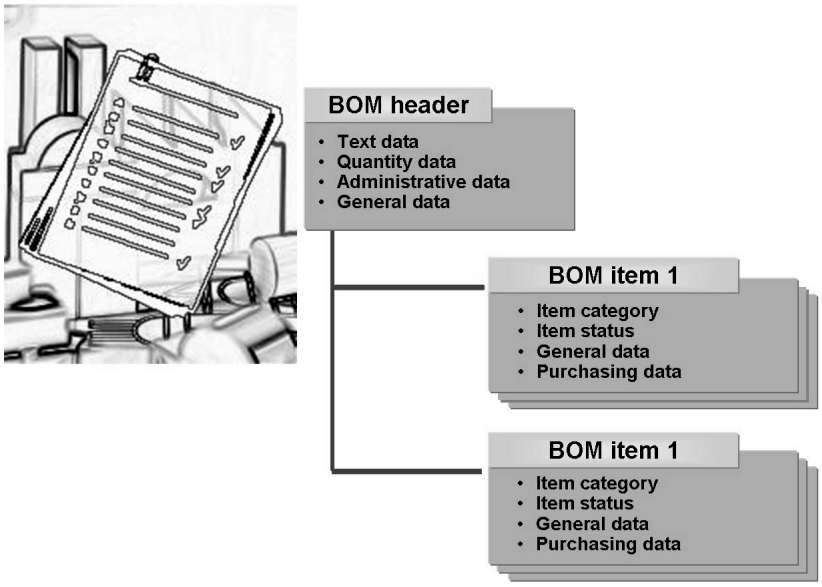

Figure 45: Bill of Material Structure

The data that you maintain in the bill of material header is valid for the entire bill of material with its components (BOM items or sub-items).

The components of a technical object are located in the BOM items. Item data is only valid for a particular item within the bill of material.

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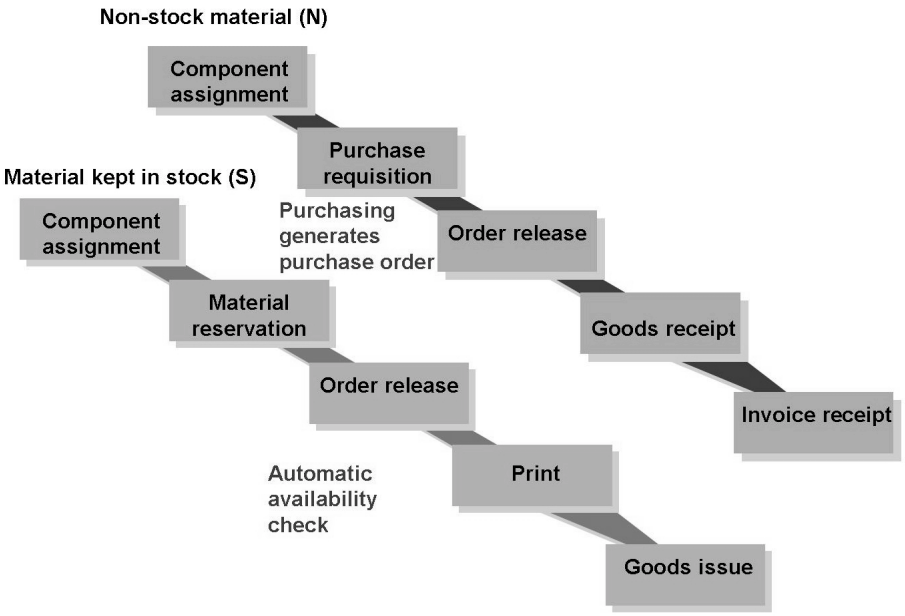

Figure 46: Bill of Material Items in Order

You can schedule bill of material components from the reference object (materials), which are required to execute the task, for each operation in the maintenance order.

The materials that you schedule for the maintenance order are reserved in the warehouse, provided that they are kept in stock. The automatic creation of the reservation is controlled using item category **S** (**stock material**).

The process flow is different if you schedule non-stock materials. In this case, ordering is initiated using item category **N (non-stock material)** that results in the automatic creation of a purchase requisition.

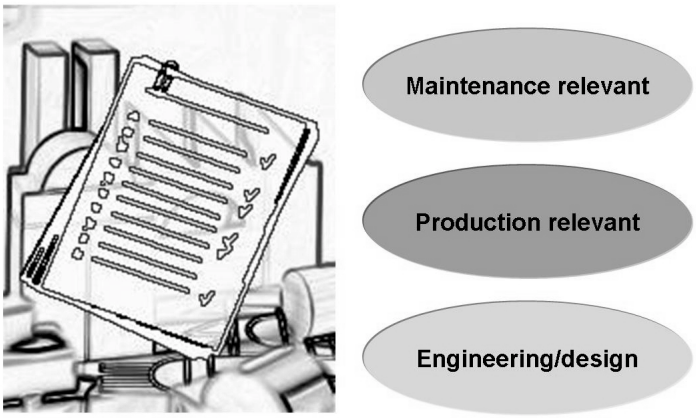

Figure 47: Item Status

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In each company, the **BOM usage** (in the Customizing for Production) defines the allowed entries for the **item status**. Various BOM item indicators are combined under the heading "item status", and they include relevant for engineering/design, relevant for production, relevant for costing and so on.

The item status indicators control the process flow in subsequent areas of work and the selection of items in the BOM explosion. They require, enable or exclude processing in these areas. If processing is supported in an enterprise area, you can maintain area-specific data for the items. For example, only items relevant for production are copied to the production order.

In order to maintain structure elements or items relevant for maintenance for a function location BOM or equipment BOM, you must select a BOM usage that does support items relevant for maintenance. BOM maintenance for the different areas (for example, engineering/design, production) is performed separately for each usage. If you create **several** bills of material with different uses for **one** material, the system saves the bills of material for each usage with their own internal number.

Assemblies thus act as structure nodes within a BOM and combine spare parts relevant for maintenance.

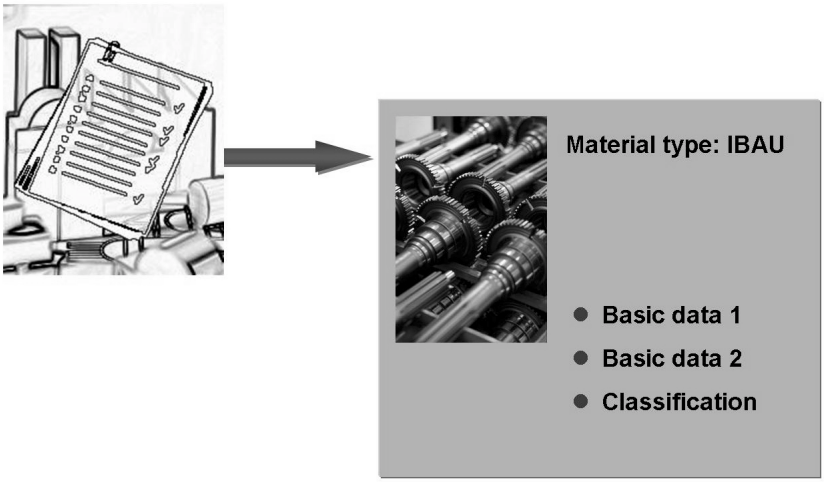

Figure 48: Maintenance Assembly

Maintenance assemblies are materials of material type IBAU. The material master record only contains basic data and classification data, in other words, inventory management is not possible for maintenance assemblies.

You use maintenance assemblies as structure elements in a bill of material if you want to:

Combine similar materials under one node

Track the costs in the Plant Maintenance Information System, but do not require inventory management

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However, you also have the option of selecting a material of another material type as a maintenance assembly.

The **Maintenance Assembly indicator** is set on the *Status/Long Text* of BOM items screen and can only be maintained for items relevant for maintenance. During the processing of maintenance tasks, items marked as a maintenance assembly are displayed as structure elements of an operational system. They can be used to describe an item from an operational system in greater detail (for example, possible location of damage).

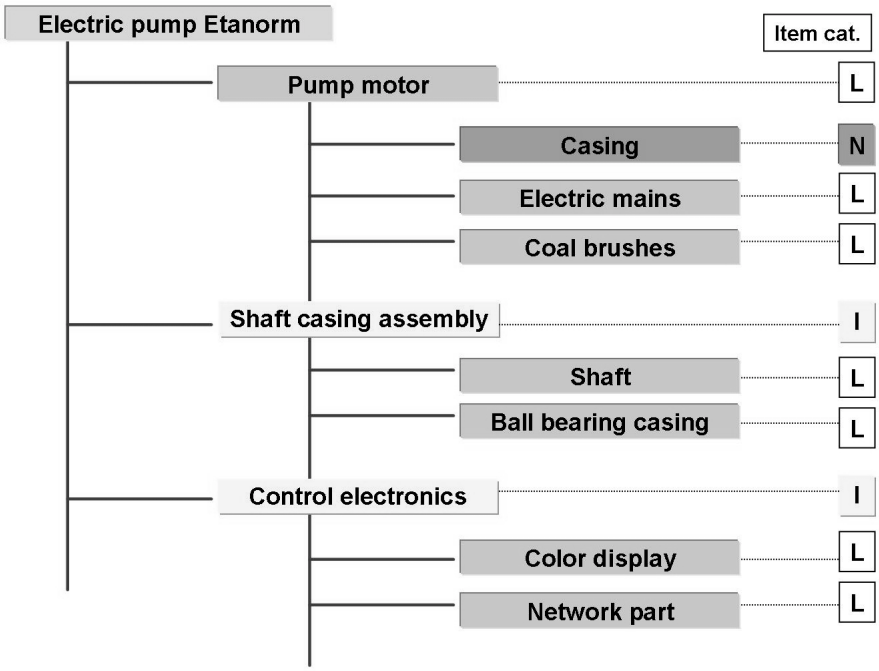

Figure 49: Multi-Level Bill of Material with Different Item Categories

The diagram above shows a multi-level bill of material for an electric pump. This bill of material consists of the following items:

- Stock item (L) - Motor
- PM structure element (I) - Shaft assembly
- PM structure element (I) - Control electronics

These items each have their own bill of material that contains the maintenance-relevant individual parts.

This overall bill of material indicates that the complete motor is available in stock as a spare part. Carbon brushes and electric mains are also inventory-managed as spare parts, whilst the casing is managed by external procurement.

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The shaft casing assembly and the control electronics are not inventory-managed as complete parts. You represent the pump PM structure elements, which provide a clear overview of the overall structure, in the bill of material. The shaft casing assembly and the control electronics are inventory-managed and can be reserved for maintenance tasks.

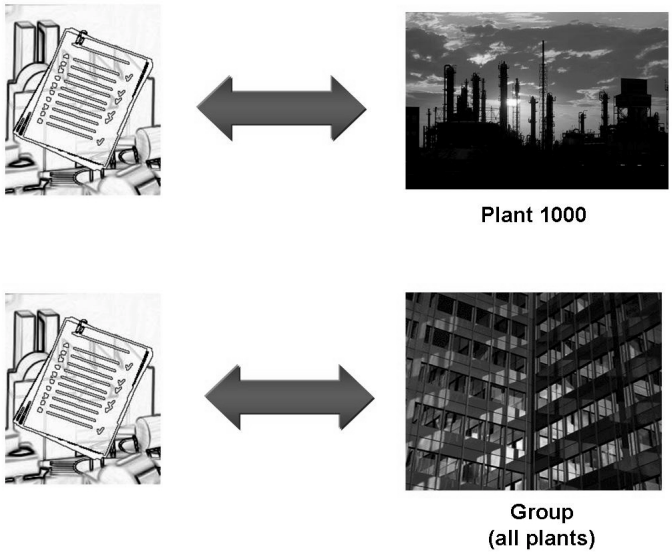

Figure 50: Plant-Specific BOM and Group BOM

A bill of material can manage data that is obligatory for plant maintenance at the technical object location. The result is the spatial validity - **the plant**. This consists of the workplaces, at which all the necessary preparatory work is organized, for example, materials planned, and task lists created. In this case, you create a plant-specific bill of material. Numerous checks are made. In the case of a material BOM, for example, a material master record with plant data for the relevant plant must exist for the material in the BOM header. When items are entered, the system checks whether plant data is also available for the material components. If the results of the checks are satisfactory, the system copies the material to the material BOM.

However, you can also create a bill of material **without** reference to a plant; this is a **group BOM**. This may be used, for example, if the engineer maintains a bill of material in the design phase that is subsequently assigned to one or more plants for Production. The system merely checks whether material master records are available. The plant-specific material checks are not performed.

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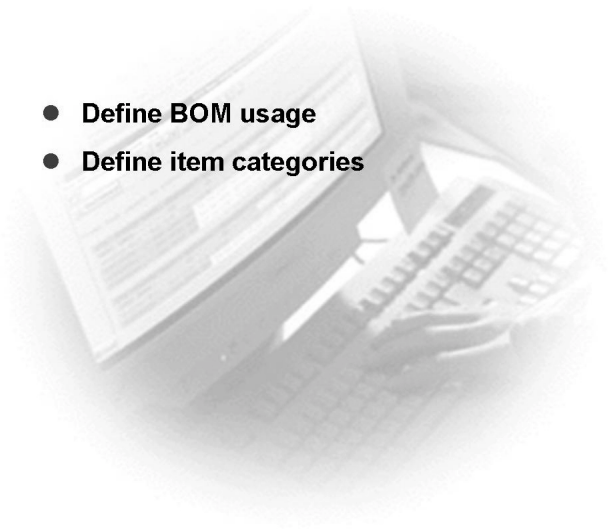
Customizing for Bills of Material



- Define BOM usage
- Define item categories

Figure 51: Customizing Settings for Bills of Material

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Exercise 5: Usage of Bills of Material

Exercise Objectives

After completing this exercise, you will be able to:

- Check the usage of bills of material
- Set parameters for the BOM item
- Create and assign bills of material relevant for maintenance

Business Example

The technical systems and buildings at IDES should be structured as extensively as possible, so that an exact picture of the object is available in each situation, thereby enabling exact planning of spare parts in the maintenance order.

Task:

To improve maintenance tasks planning for your pump TET-##, a material BOM should be made available in plant 1000.

The maintenance manager stipulates that the the pump motor and the casing only are to be available as inventory-managed substitute components for the pump assembly, since in certain situations it would be necessary to replace both of these components immediately in the event of a breakdown.

The shaft casing assembly and the control electronics on the other hand should only appear as PM structure elements in the structure to improve the overview of the overall structure.

It should be possible to reserve the individual parts in the shaft casing assembly and the control electronics for repairs.

The company already has several material BOMs available.

- P-1000

- P-6000

- P-7000

1. Check the bills of material referred to above.

   Which bill of material meets the requirements?

   How do you proceed?

2. Assign the material BOM determined to your equipment **TET-##** and check the structure in the equipment master record. How do you proceed?

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Solution 5: Usage of Bills of Material

Task:

To improve maintenance tasks planning for your pump TET-##, a material BOM should be made available in plant 1000.

The maintenance manager stipulates that the the pump motor and the casing only are to be available as inventory-managed substitute components for the pump assembly, since in certain situations it would be necessary to replace both of these components immediately in the event of a breakdown.

The shaft casing assembly and the control electronics on the other hand should only appear as PM structure elements in the structure to improve the overview of the overall structure.

It should be possible to reserve the individual parts in the shaft casing assembly and the control electronics for repairs.

The company already has several material BOMs available.

- P-1000
- P-6000
- P-7000

1. Check the bills of material referred to above.

   Which bill of material meets the requirements?

Continued on next page

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How do you proceed?

a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Bill of Material → Material Bill of Material → Display***

or

SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Bill of Material → Material BOM → Structural Display

Two factors can be used to check that the assemblies have been represented correctly:

- Item category > This should be available for the shaft casing assembly and the control electronics **I (PM structure element)**

- Material type > This should be available for the shaft casing assembly and the control electronics **plant maintenance assembly**

>>Double click on the material number to check the material type in the bill of material.

The requirements described above are only met by material BOM **P-7000**.

2. Assign the material BOM determined to your equipment **TET-##** and check the structure in the equipment master record. How do you proceed?

a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment → Change***

Tab page *Structure*, enter material number `P-x000` in the *Construction type* field and **save**

Go to Change or Display mode again and use symbol for **structure list**.

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Lesson Summary

You should now be able to:

- Describe the BOM structure
- List different BOM categories

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Unit Summary

You should now be able to:

- Describe the BOM structure
- List different BOM categories

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Unit 4

Serial Numbers

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Unit Overview

This chapter deals with the mapping and tracking of individual items from both the Plant Maintenance and Material Management point of view.

Unit Objectives

After completing this unit, you will be able to:

- Create serial numbers
- Perform the settings in the serial number profile

Unit Contents

Lesson: Working with Serial Numbers 104
Exercise 6: Working with Serial Numbers 113

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Lesson: Working with Serial Numbers

Lesson Overview

This lesson shows how to create serial numbers, what settings in Customizing are neccesary for this, and how the serial numbers can then be used effectively.

Lesson Objectives

After completing this lesson, you will be able to:

- Create serial numbers
- Perform the settings in the serial number profile

Business Example

In a company, it should be possible to track certain material, for example, the goods issue of a single piece of material to a customer. Furthermore, inventory management should be possible for dismantled pieces of equipment that are being stored in the warehouse.

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Application Examples

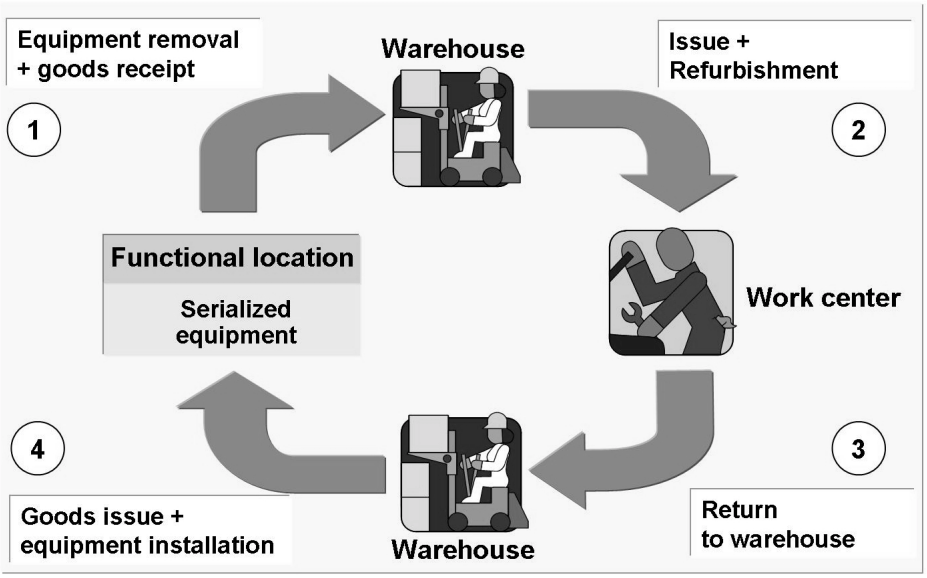

Figure 52: Application Example: Plant Maintenance

1. A faulty piece of equipment has to be dismantled and transferred to the warehouse. A prerequisite for this function is that the equipment is serialized, that is, the tab page for serialization data is activated and a serial number links the equipment to a material.

   The defective piece of equipment is dismantled and transferred to the warehouse for refurbishment. You have a function for installing and dismantling equipment with simultaneous goods movement.

2. The defective, serialized equipment should be refurbished. The serial number links the equipment with a material with condition-based evaluation. A material is broken down into different partial stocks by a condition-based evaluation, that is, there are the batches “as new” (C1), “refurbished” (C2) and “faulty” (C3).
3. The refurbished piece of equipment is returned to the warehouse using the linked material and serial numbers.
4. In one step, you can remove a piece of equipment from a storage location and install it at another piece of equipment or functional location.

Serialization thus enables inventory management of pieces of equipment.

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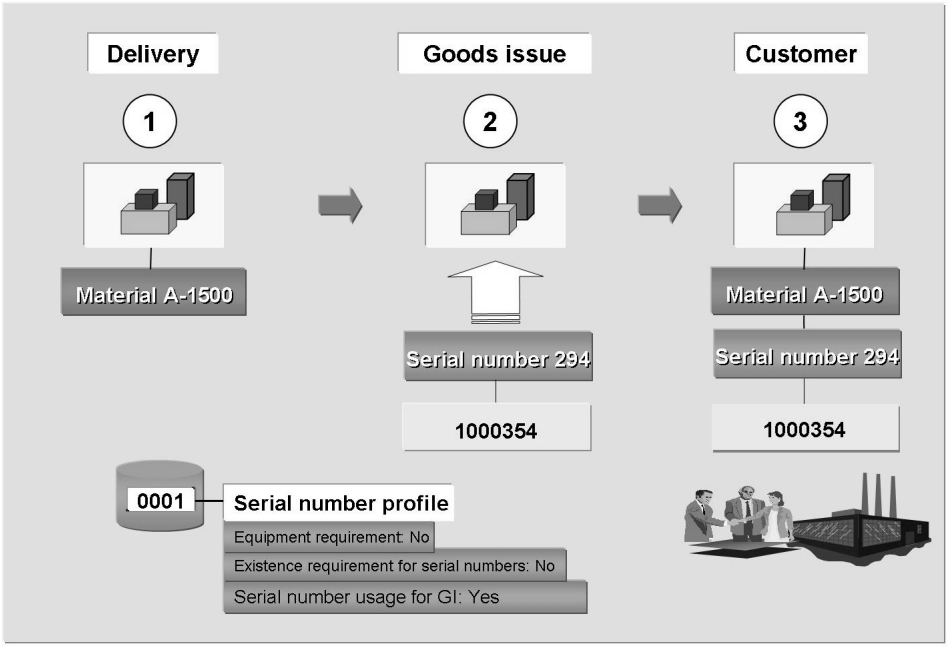

Figure 53: Application Example: Sales / Customer Service

1. A typical request in Sales and Customer Service is that a serialized material item is to be delivered to a customer, on the condition that it should be uniquely identifiable. The material stock can be kept in the warehouse for the present without single items being traced.
2. When the material is linked with a serial number profile that has been defined accordingly, the serialization occurs automatically upon goods issue, meaning that serial numbers are assigned to the individual pieces. If you also made the setting for the equipment requirement in the serial number profile, an equipment master is created automatically upon goods issue, together with the serial number.
3. You can store data relating to the location or the main work center on the basis of the equipment. If the customer makes a complaint, a service message or service order can be recorded for the piece of equipment.

Material and Serial Number

If a material individual piece is to be uniquely identifiable in terms of inventory management, a serial number profile must be entered in the material master. The serial number profile defines the business operations for which serial numbers are mandatory.

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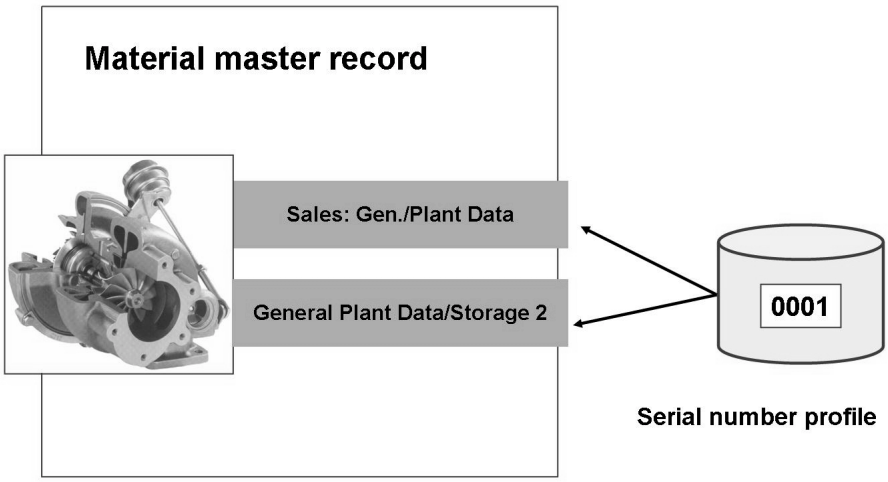

Figure 54: Material and Serial Number

The serial number profile can be entered in one of the following views in the material master:

- *Sales: General/Plant data*
- *General plant data / storage 2.*

If assignment is performed in the view *Sales:Gen./plant data*, the profile is displayed automatically in the view

General plant data/Storage 2 (and vice versa).

The combination material/serial number is unique across the client.

Equipment and Serial Number

Two options are available for linking the equipment, material and serial number:

- The material and serial number can be assigned to an existing equipment manually.
- The system creates the equipment and serial number automatically during a posting.

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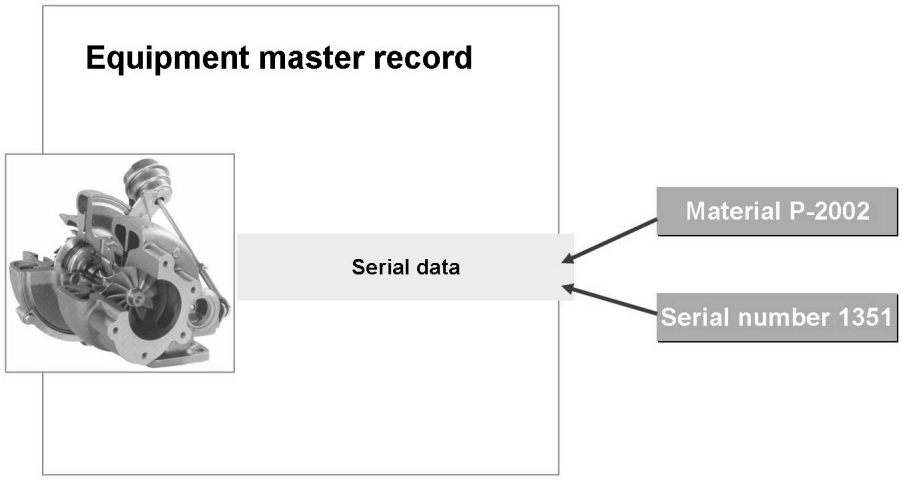

Figure 55: Serialization of Existing Equipment

Assigning a serial number to a piece of equipment enables the equipment to be managed from an inventory management perspective.

This means that you can use the material serial number to also manage the equipment from Plant Maintenance from a Material Management perspective. This is desirable, if, for example, an object that was previously only managed as a piece of equipment is to be dismantled and transferred to the warehouse.

You perform the assignment in the serialization data of the equipment master record. If you enter a material that already has a serial number profile for the serialization of individual pieces of equipment in the equipment master record, the system will display the last serial number assigned for this material (if a serial number was already assigned). In this way you can connect the new serial number directly to the last serial number assigned.

You can manage the relationship between the material and the equipment as follows:

- You can synchronize the equipment number and the serial number with each other.
- You can synchronize the material coupled with the equipment with the material in the *Construction Type* field of the equipment (Structure tab page).

Note: The standard display of the *Serial Data* view in the equipment master record can be preset in the Customizing settings for the equipment category. If this view was not activated in Customizing, the tab page can be displayed afterwards.

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Serial Number Profile

A serial number profile is a group of data stored under a 4-figure key that defines the conditions and the operations for the assignment of serial numbers for material items.

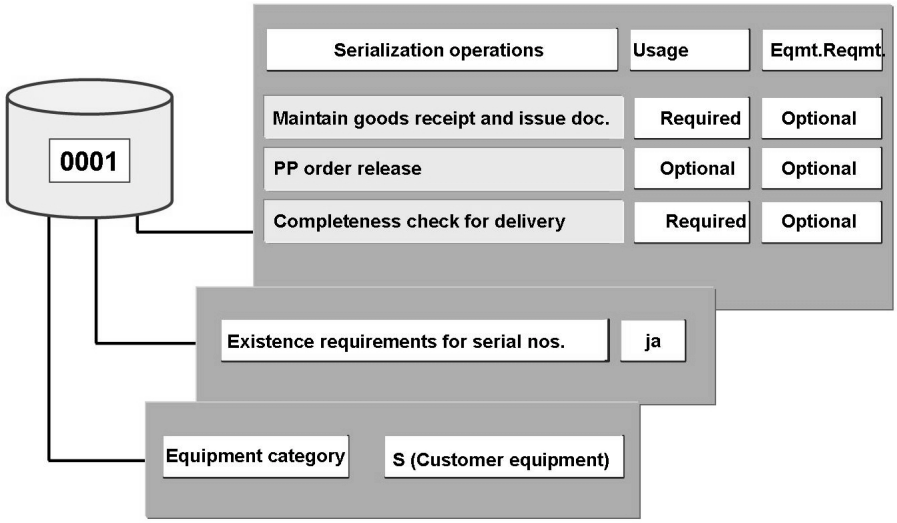

Figure 56: Serial Number Profile

Serial number profiles are defined during system configuration in Customizing of Plant Maintenance. You can define the following parameters:

- Business transactions for which a check is performed
- Existence requirement for serial numbers
- Automatic creation of the serial number
- Existence requirement for pieces of equipment
- Equipment category

Stock Check for Serial Numbers

Stock check describes the process of checking the stock information in the serial number master record for a goods movement.

The stock information in the serial number is compared with the stock data of the materials management. If a conflict is identified here, the system terminates the posting according to the setting that has been made.

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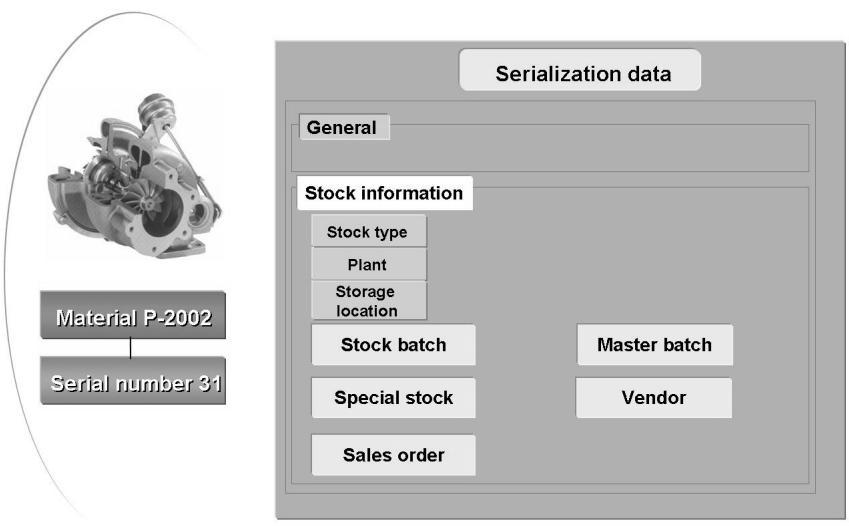

Figure 57: Stock Information in the Master Record

The master record for serial numbers provides the following stock information:

- Stock type, plant, and storage location
- Stock batch and master batch
- Special stock
- Vendor and sales order

The serial numbers are not just updated for the plant and storage location. They are also updated for all stock types (for example, unrestricted-use stock, stock in quality inspection, blocked stock returns, stock in transfer, stock in transit, blocked stock) or all special stock (for example, open order quantity, project stock, customer and vendor consignment stock).

Serial numbers created before the R/3 4.5A Release do not contain stock information automatically. However, this information is added gradually with each movement of the serial number.

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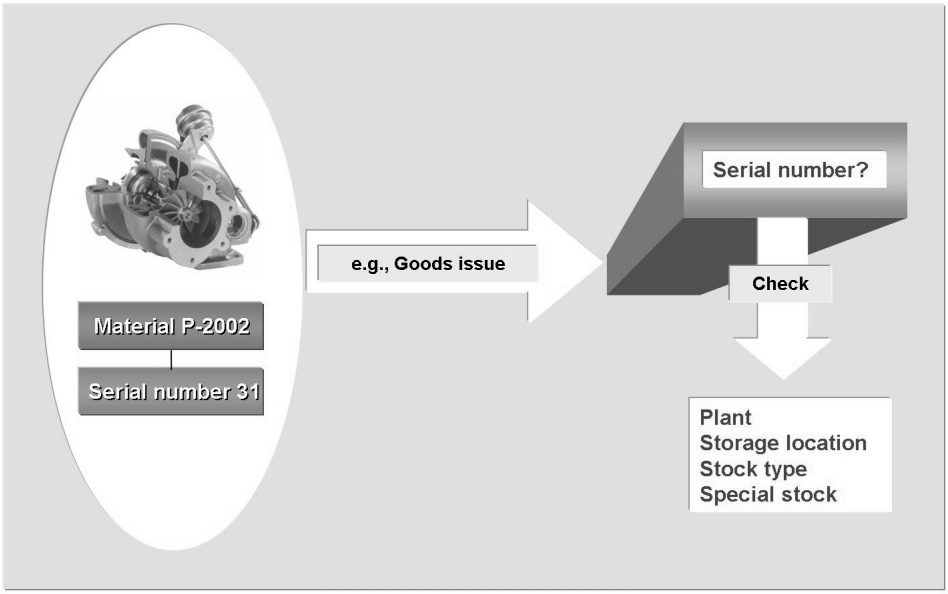

Figure 58: Checks for Goods Movements

If goods are moved, the fields relevant for stock are checked.

For each movement, the system compares this data with the data from inventory management. Depending on the setting for the serial number profile in Customizing, if the data does not correspond, the movement is either prohibited, allowed, or allowed with a warning. After the movement, the serial number is updated with the current stock data from inventory management.

Stock verification must be activated in the serial number profile (Customizing).

The following programs support you in monitoring the stock information:

- Program **RIMMSF00**: This program compares the stock data from inventory management with the stock data in the serial number master data. The cumulative serial number stock is compared with each item of special stock from inventory management.
- Program **RISERNR9**: This program is used to copy the stock verification indicator from the serial number profile into the individual serial numbers. The stock verification indicator must then be copied if you have changed the indicator in the profile and already performed goods movements with serial numbers.

Under certain conditions you can **change stock information** in the serial number manually.

- No plant has been entered
- No stock check is active
- Stock check is active only with a warning

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If several users simultaneously attempt to create serial numbers for the same material number, a **lock** ensures consistent number assignment.

Customizing

- **Serial numbers profile**
- **Serialization operations and movement types**

Figure 59: Customizing Settings for Serial Numbers

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Exercise 6: Working with Serial Numbers

Exercise Objectives

After completing this exercise, you will be able to:

- Serialize a piece of equipment
- Handle material and equipment in conjunction with serial numbers for different business management operations

Business Example

In the company, it should be possible to individually track certain objects subject to inventory management, so that in the event of damage, it is possible to reconstruct which individual item was installed in the system. At the same time, maintenance should also be performed for these individually tracked objects.

Task 1:

Serialize existing equipment

1. You want to be able to activate your equipment **TET-##** (see Unit Equipment) from a materials management view, for example, to move it into stock for a refurbishment. Display the *Serial Data* view in the master record for **TET-##**, and *Serialize* your piece of equipment.

   Use material **T-FP2##** to do this. Note the last serial number to be assigned when doing this.

   How do you proceed?

2. Display all serial numbers for the material **T-FP2#'#**, and check whether your piece of equipment or replacement equipment is displayed.

Task 2:

Exchange serialized equipment (optional)

1. Your serialized piece of equipment **TEW-##** is defective. It must be replaced and put into storage. Find the replacement piece of equipment **TEW-##** in the system.

   How do you proceed?

2. Dismantle your piece of equipment **TEW-##** from the functional location and at the same time place it in storage in plant **1000**, storage location **0001**, with the movement type **202**. The dismantling is assigned to cost center **4110**.

   How do you proceed?

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3. Install the replacement piece of equipment **TEX-###** at the functional location **##-BR2-11**. Use the movement type **201** and assign the goods movement to cost center **4110**.

   Set the mode *Forced installation/removal*

Task 3:

Goods receipt with serial number assignment (optional)

1. You receive a delivery of 5 pumps of material **T-FP400**. These pumps should also be treated by the system as pieces of equipment.

   In plant **1000**, storage location **0001**, create a goods receipt *Other* for this material. Choose movement type **501** as well as the automatic serial number assignment.

   How do you proceed?

   Hint: Choose the options *Goods Receipt* and *Other*.

2. Synchronization of serial number and equipment number.

   Display a list of the automatically generated serial numbers for the material **T-FP400**. In the list display, show who created the serial numbers.

   How do you proceed?

   What do you find out?

   _____

   _____

   _____

   Which setting must be made in the material master record so that the equipment number and serial number are kept synchronous?

   _____

   _____

   _____

3. Synchronization of material and construction type for serial numbers

   Branch from the serial number list into one of the pieces of equipment that you have created.

   How do you proceed?

   _____

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_____

_____

Go to the *Serial Data* tab page and compare the material with the construction type of the equipment.

What do you find out?

_____

_____

Display the material BOM that was automatically assigned to this piece of equipment.

How do you proceed?

Hint: In the equipment, you have to enter the *Maintenance plant* so that the BOM can be exploded. Use maintenance plant **1000**.

_____

_____

Task 4:

Stock Check (Optional)

1. What does the stock check of a serial number comprise?
2. How is the stock check configured in Customizing?

Task 5:

Exercises for Customer Service (Optional)

1. Stock Overview

   Display the stock overview for material **R-1001**.

   What is the unrestricted-use stock in plant **1200**, storage location **0001**?

   _____

   Which material serial numbers belong to this stock?

   _____

2. Display serial number master record

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Display the serial number **10000** for your material **R-1001**.

Determine the following data:

Equipment category:

_____

System status:

_____

Equipment number:

_____

Sold-to party:

_____

Number of the sales order with which this device was sold:

_____

3. Displaying Stock Information

Determine the following stock information for serial number **10050** of material **R-1001**.

Plant:

_____

Storage location:

_____

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Solution 6: Working with Serial Numbers

Task 1:

Serialize existing equipment

1. You want to be able to activate your equipment **TET-##** (see Unit Equipment) from a materials management view, for example, to move it into stock for a refurbishment. Display the *Serial Data* view in the master record for **TET-##**, and *Serialize* your piece of equipment.

   Use material **T-FP2##** to do this. Note the last serial number to be assigned when doing this.

   How do you proceed?

   a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment → Change***

      Edit → View Selection > Serial Number

      Enter material **T-FP2##** on the *Serial Data* tab page, ENTER > The last number assigned is displayed – enter the next number for the current piece of equipment accordingly

2. Display all serial numbers for the material **T-FP2#'#**, and check whether your piece of equipment or replacement equipment is displayed.

   a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Serial Numbers → List Editing → Display***

      In the pre-configured variants, the columns *Material*, *Serial Number*, *Equipment*, *Plant* and *Storage Location*, *Description*, *System Status*, *Batch*, *Stock Type* and *Special Stock* are displayed.

      You can use the menu bar to integrate additional columns:

      Settings → Layouts → Current

Task 2:

Exchange serialized equipment (optional)

1. Your serialized piece of equipment **TEW-##** is defective. It must be replaced and put into storage. Find the replacement piece of equipment **TEW-##** in the system.

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How do you proceed?

a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment → List Editing → Find Replacement Equipment***

Enter number **TEW-##** and choose the Execute pushbutton.

The characteristic value assignment is copied from the original object, that is, **TEW-##**, and can be displayed in the following dialog box using the *Valuation* pushbutton.

Choose the *Execute* pushbutton.

Hint: The replacement equipment search function has also been available for spare parts planning in the maintenance order.

2. Dismantle your piece of equipment **TEW-##** from the functional location and at the same time place it in storage in plant **1000**, storage location **0001**, with the movement type **202**. The dismantling is assigned to cost center **4110**.

How do you proceed?

a) ***SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment → Dismantling/Installation with Goods Movement***

Choose the *Dismantling* option. Enter the data and choose the *Save* pushbutton.

3. Install the replacement piece of equipment **TEX-###** at the functional location **##-BR2-11**. Use the movement type **201** and assign the goods movement to cost center **4110**.

Set the mode *Forced installation/removal*

a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment → Dismantling/Installation with Goods Movement***

Choose the *Install Equipment with Material Movement* option. Enter the data and press the button *Forced installation/removal* and then *Save*.

Hint: The *Forced installation/removal* mode is for deactivating the Configuration Control, as it is not required.

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Task 3:

Goods receipt with serial number assignment (optional)

1. You receive a delivery of 5 pumps of material **T-FP400**. These pumps should also be treated by the system as pieces of equipment.

   In plant **1000**, storage location **0001**, create a goods receipt *Other* for this material. Choose movement type **501** as well as the automatic serial number assignment.

   How do you proceed?

   Hint: Choose the options *Goods Receipt* and *Other*.

   a) ***SAP menu → Logistics → Materials Management → Inventory Management → Goods Movement → Goods Movement (MIGO)***

      Choose *Goods Receipt* and *Other*.

      Enter the material number, quantity, plant or storage location, and movement type in the detailed data. Set the indicator for *Automatic serial number assignment* (tab page*Serial Numbers*).

2. Synchronization of serial number and equipment number.

   Display a list of the automatically generated serial numbers for the material **T-FP400**. In the list display, show who created the serial numbers.

   How do you proceed?

   What do you find out?

   _____

   _____

   _____

   Which setting must be made in the material master record so that the equipment number and serial number are kept synchronous?

   _____

   _____

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a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Serial Numbers → List Editing → Display or Change***

Search for material **T-FP400**.

A piece of equipment is automatically created in the background for the serial number. The equipment number and serial number are identical.

b) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Material → Change***

Tab page ***General plant data / storage 2***. In the *General plant data* area, the field *Serialization level* is set to **1** (equipment number and serial number kept synchronous).

Hint: The automatic creation of equipment during goods receipt depends on the Customizing of the serial number profile.

3. Synchronization of material and construction type for serial numbers

Branch from the serial number list into one of the pieces of equipment that you have created.

How do you proceed?

Go to the *Serial Data* tab page and compare the material with the construction type of the equipment.

What do you find out?

Display the material BOM that was automatically assigned to this piece of equipment.

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How do you proceed?

Hint: In the equipment, you have to enter the *Maintenance plant* so that the BOM can be exploded. Use maintenance plant **1000**.

_____

_____

a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Serial Numbers → List Editing → Display or Change***

Select material **T-FP400** and show the column *Created by* in the hit list. Double click on the number of one of your pieces of equipment to branch to the master record.

b) The material numbers are identical.

c) Choose the *Structure List* pushbutton in the equipment master record.

Task 4:

Stock Check (Optional)

1. What does the stock check of a serial number comprise?

   a) During the stock check of a serial number, the stock batch, master batch, special stock, customer, and sales order are also checked in addition to the plant and storage location if a goods movement occurs. This ensures a comparison of the stock information in the serial number with the stock information in the Materials Management.

2. How is the stock check configured in Customizing?

   a) ***SAP Menu → Tools → Customizing → IMG → Execute Project***

   Button *SAP Reference IMG*

   Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Serial Number Management → Define Serial Number Profiles

   The stock check is activated for each serial number profile in the column StkCk. Here, you also define how the system should respond in the event of inconsistencies in the stock data: Warning, error, or no stock check.

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Task 5:

Exercises for Customer Service (Optional)

1. Stock Overview

   Display the stock overview for material **R-1001**.

   What is the unrestricted-use stock in plant **1200**, storage location **0001**?

   _____

   Which material serial numbers belong to this stock?

   _____

   a) ***SAP menu → Logistics → Customer Service → Management of Technical Objects → Material → Stock Overview***

Field Name or Data Type	Values
Material	*R-1001*

   Execute

Field name or data type	Values
Column "Unrestricted use"	*155 pieces*

   Position the cursor on the line for plant or storage location and from the menu bar choose ***Environment → Equipment/serial no***.

   b) The serial numbers **10044** to **10199** are in stock.

2. Display serial number master record

   Display the serial number **10000** for your material **R-1001**.

   Determine the following data:

   Equipment category:

   _____

   System status:

   _____

   Equipment number:

   _____

   Sold-to party:

   _____

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Number of the sales order with with which this device was sold:

_____

a) ***SAP Menu → Logistics → Customer Service → Management of Technical Objects → Serial Numbers → Display***

Field name or data type	Values
Material	*R-1001*
Serial number	*10000*

Enter

Field name or data type	Values
Equipment category	*S (Customer equipment)*
System status	*INST (equipment installed)* *ECUS (equipment at customer site)*
Equipment number	*See value*
Sold-to party	*Customer 1032*

Determine the number of the sales order by choosing *History*. Select the delivery document (brown color) and choose *Document*. In the delivery overview, choose *Document flow*.

3. Displaying Stock Information

Determine the following stock information for serial number **10050** of material **R-1001**.

Plant:

_____

Storage location:

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a) ***SAP menu → Logistics → Customer Service → Management of Technical Objects → Serial Numbers → Display***

Field name or data type	Values
Material	*R-1001*
Serial number	*10050*

Enter

Field name or data type	Values
Plant	*1200*
Storage location	*0001*

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Lesson Summary

You should now be able to:

- Create serial numbers
- Perform the settings in the serial number profile

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Unit Summary

You should now be able to:

- Create serial numbers
- Perform the settings in the serial number profile

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Unit 5

Measuring Points and Counters

Unit Overview

This chapter shows the mapping of measuring points and counters onto technical objects in order to document and track certain measurement items.

The counters can be used as a basis for performance-based maintenance planning.

Unit Objectives

After completing this unit, you will be able to:

- Describe the basic concept of the measuring point
- Describe the basic concept of the counter

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Lesson: Working with Measuring Points and Counters

Lesson Overview

This lesson shows the basic functions for measuring points and counters.

Lesson Objectives

After completing this lesson, you will be able to:

- Describe the basic concept of the measuring point
- Describe the basic concept of the counter

Business Example

Your objects have measuring points and counters to record flow quantities or operating hours in order to facilitate better monitoring of capacity utilization.

Basics

Measuring points are physical and/or logical locations at which a particular condition is described – for example; the temperature of coolant in a nuclear power station after an outflow from the pressure vessels, or the number of rotations per minute of the rotary blades of a wind-driven power station. Measuring points are located at technical objects.

Counters are resources that enable you to represent the wear and tear of an object or the consumption or reduction in its useful life, for example, the mileage indicator of a motor vehicle or the electricity consumption meter of an electrically-powered system. Counters are located at technical objects.

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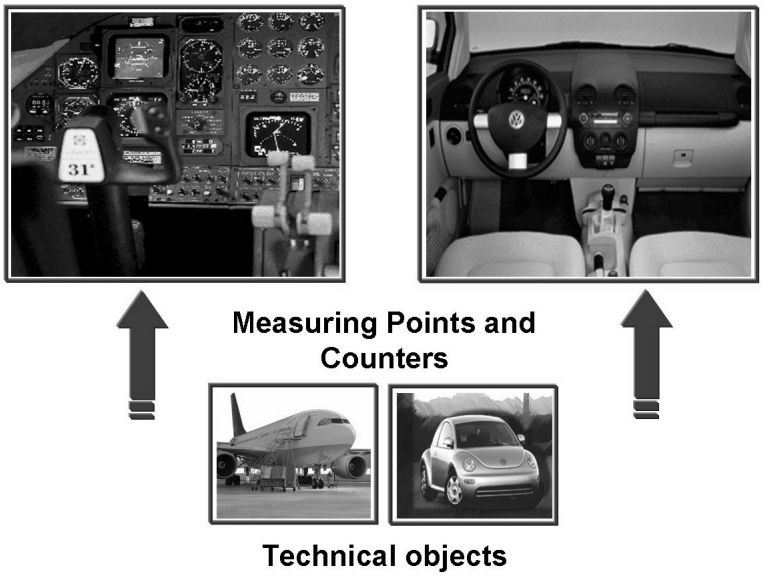

Figure 60: Measuring Points and Counters

You can enter measurement or counter readings for each object to be maintained. This makes sense if you want to document the condition of an object based on measurement readings or if the regular maintenance of an object depends on its meter readings.

Various **measuring point types** can be defined in Customizing.

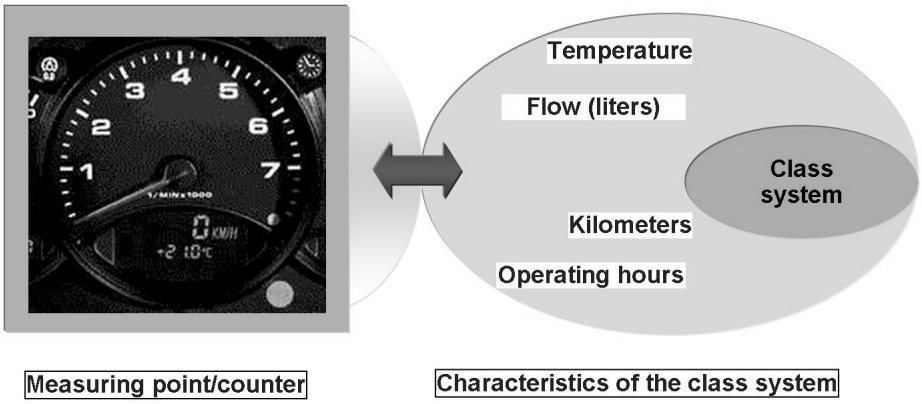

Figure 61: Measuring Point and Characteristics

Each measuring point or counter refers to a characteristic (for example, kilometer, liter, operating hours).

The characteristic of a measuring point or counter determines the characteristic unit in which measurement and counter readings are entered:

The characteristic *Ratio* can, for example, have the characteristic unit *Percent*.

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The characteristic *Temperature* can, for example, have the characteristic unit *Degrees Celsius* or *Degrees Fahrenheit*.

Before you begin maintaining the measuring points and counters for your objects, you should create all the characteristics in the **classification system** (cross-application functions in the SAP System).

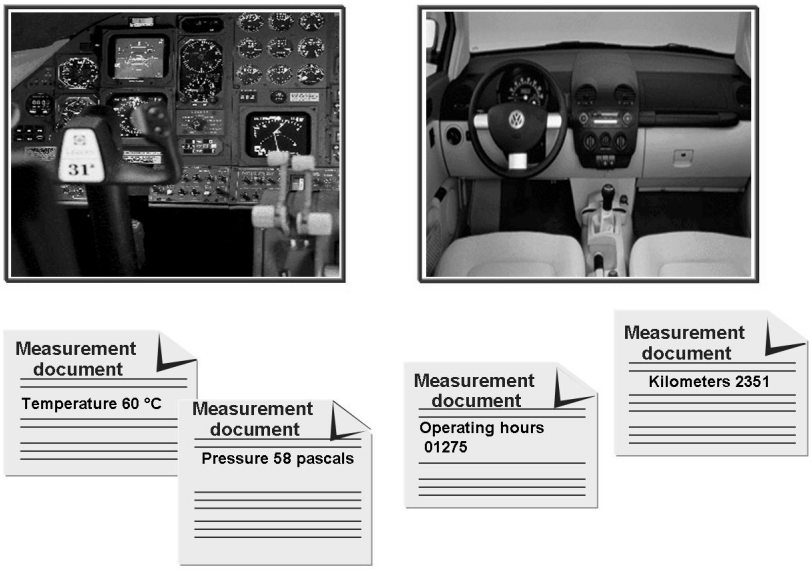

Figure 62: Measurement Documents

A **measurement document** is the overall term used to describe the data entered in the system after measurement at a measuring point or after a meter reading.

A measurement document can contain the following data:

- Data on the measuring point (measuring point number, measurement position, description, characteristic, and unit)
- Data on the measuring result (time of measurement/reading, measurement/counter reading, qualitative assessment of the measurement result/counter reading)
- Additional information (technician, explanations etc.)

In addition, you can assign a processing status to the measurement document. This status can indicate a need for action based on the measurement value or counter reading and whether the need for action based on these readings is already covered by an existing task.

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Measurement Document Entry

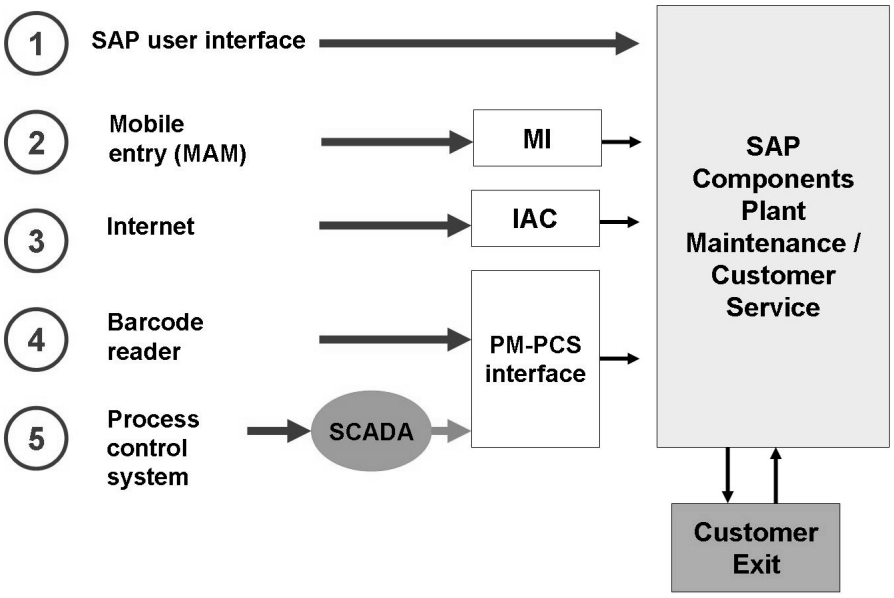

Figure 63: Overview: Measurement Document Entry

You enter data in the SAP System manually using the SAP user interface (SAP GUI). You also have the option of recording measurement readings from a maintenance notification or a maintenance order (fleet management).

Measurement documents can also be entered remotely using Mobile Asset Management **(MAM)**. The interface here is the Mobile Infrastructure **(MI)** for the **SAP Netweaver** integration platform.

Using the Internet application component **(IAC)**, you enter data in the input mask in the browser, and transfer it to the SAP System by means of the Internet.

You can enter data using a barcode reader, and copy it to the SAP System using the **PM-PCS interface**. The PM-PCS interface is an interface between the SAP system and external systems, such as a process control system (PCS).

Process control system data is data that is created during the monitoring, control, regulation and optimization of a technical process. You can copy this data to the SAP system using the PM-PCS interface.

For this purpose, you can use a **SCADA system** (Supervisory Control And Data Acquisition System) that filters data from the process control system and only transfers what is really relevant to the SAP System.

You can use various **customer exits** to automate your business processes and, for example, automatically generate a malfunction report from a measurement document.

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Figure 64: Mobile Measurement Document Entry

Mobile scenarios are becoming increasingly important for Plant Maintenance and Customer Service, as they make it possible to process maintenance tasks regardless of location.

The functions of mobile maintenance are represented by the **Mobile Asset Management (MAM)** as part of the mobile solution portfolio.

We differentiate between the **online scenario** and the **offline scenario**.

For the online scenario, the data is determined, for example, using a mobile telephone (WAP scenario) or a wireless PDA (html). For online scenarios, you always have access to up to date system data on site.

The offline scenario provides functions that allow you to process complex maintenance tasks without being permanently linked to the back-end system. Here, the mobile end device has a local installation consisting of mobile infrastructure and mobile application.

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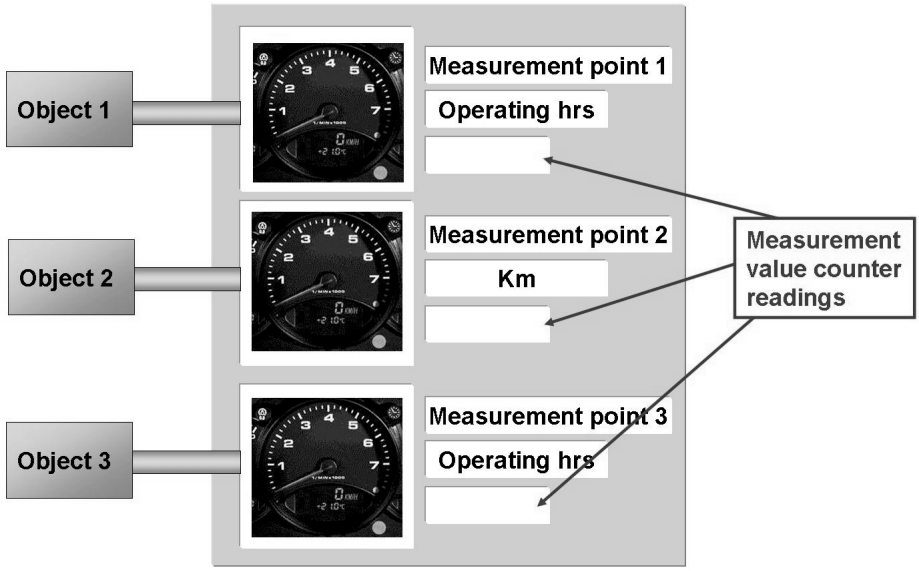

Figure 65: Measurement reading entry list

To simplify the entry of routine counter and measurement readings for several objects, a **measurement reading entry list** can be created as a master record. This list comprises different measuring points or counters for different objects.

When determining measurement readings or making counter readings, the respective values can be entered directly in this list. As before, the update occurs within a measurement document.

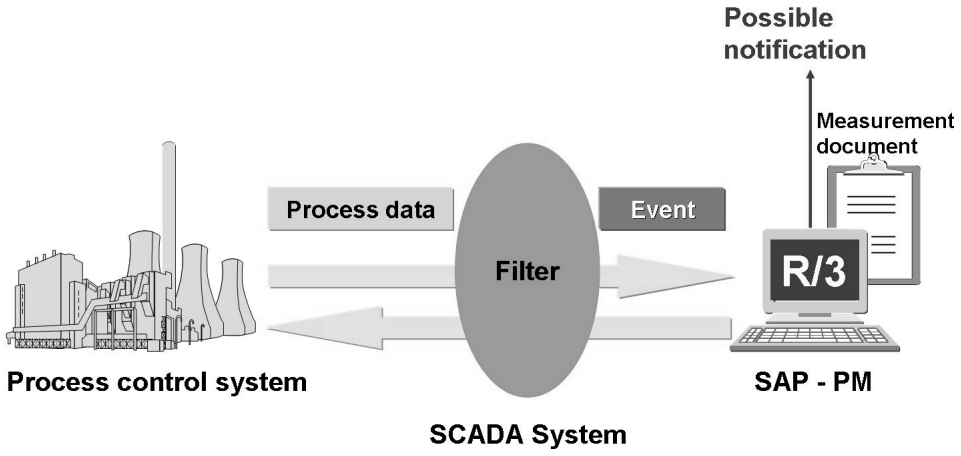

Figure 66: PM-PCS Interface

You can use this interface to transfer measurement and counter readings from external systems to the SAP System. The data is saved in measurement documents in the SAP System and can be used by both the Plant Maintenance and Customer Service components.

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Performance-based preventive maintenance enables you to plan maintenance based on counter readings that are managed for the technical objects to be maintained.

You can use measurement documents to document the subject for system security, work safety and environmental protection.

Possible external systems:

- Mobile data entry systems
- Process control systems (PCS)
- Building control systems
- SCADA systems (Supervisory Control And Data Acquisition Systems)

Process control systems provide a wide range of data for processes, buildings or infrastructure. SCADA systems perform a filtering function here. They filter out maintenance-relevant data, and thereby protect the SAP System from an excess of process data. In addition, SCADA systems are responsible for the communication between one or more process control systems and the SAP System.

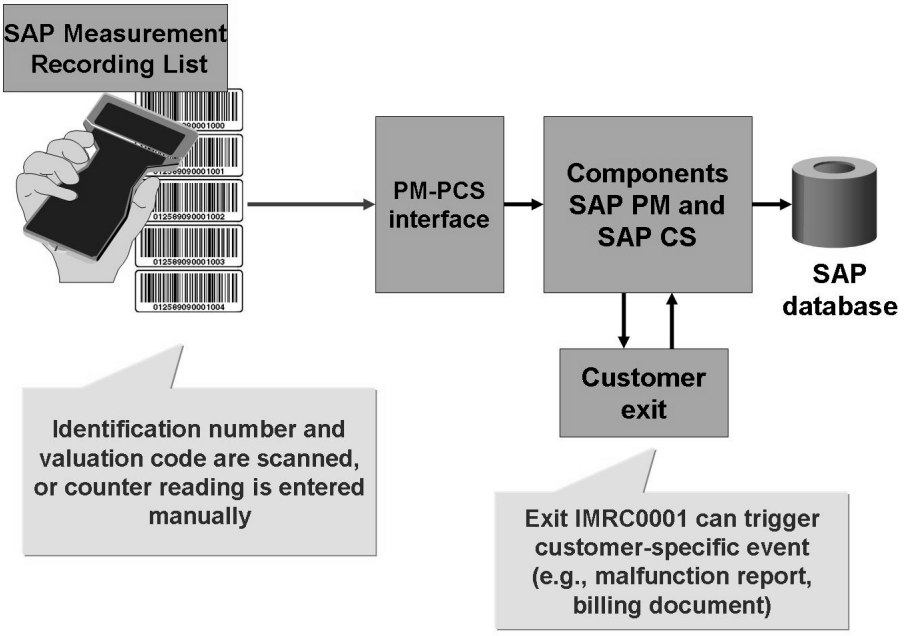

Figure 67: Measurement Document Entry Using a Barcode

Example: You have mapped an apartment building in the SAP System by means of a functional location hierarchy. A current meter represented by means of a barcode ID is assigned to each apartment, and is read once a year. The technician who reads the meter enters the meter reading result in the barcode reader manually by means of a block of numerals. Consumption billing is performed in the SAP

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System in the industry sector component *Real Estate* (RE) on the basis of the counter readings recorded. See Note 5196 in SAPNet for information on the prerequisites if you want to print barcodes with SAPscript using the SAP System.

When preparing the work, you compile the measuring points and counters for the technician in the order of the round. In the SAP System, this is shown as the measurement recording list. The technician first scans the barcode ID for each measuring point and counter using a barcode reader, and then enters the counter reading manually. After the round has been ended, you transfer the data from the technician's barcode reader to the docking station using infrared signals. The barcode reader supplies the data which is copied to the SAP System using the PM-PCS interface. The SAP System creates a measurement document for each measurement reading and counter reading. If you use the customer exit IMRC0001, the measurement document serves as the basis for a consumption billing in the industry sector component Real Estate (RE).

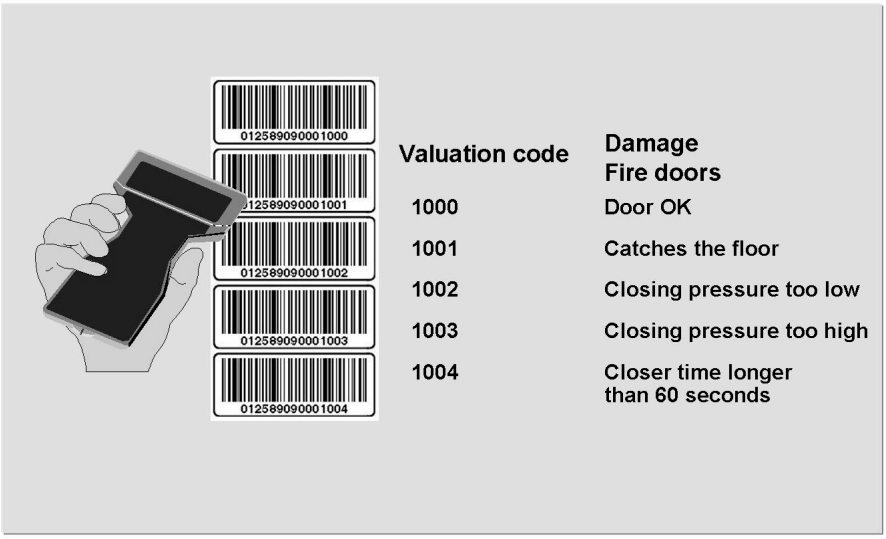

Figure 68: Barcode and Valuation Code

You can also use the catalog system to enter measurement or counter readings. The catalog system enables you to define permissible values for a measuring point that you can select using the catalog hierarchy when entering measurement readings. You can use this function when you want to predefine qualitative or descriptive measurement readings in the catalog system, or if you want to use these predefined values when entering counter readings:

- System reaction when the measurement reading is exceeded.
- Permissible tolerance time for entering future measurement readings.

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Example: You have mapped a building, including the fire doors, in the SAP System using a functional location hierarchy. A measuring point represented by means of a barcode ID is assigned to each fire door. A meter reader checks each individual fire door once a month. The inspection result is usually “Door OK”, but this result should also be documented in the SAP System.

Possible damage can be shown clearly as valuation codes. The meter reader also enters these valuations codes by means of a barcode. Damage identified during the inspection should automatically trigger a malfunction report in the SAP System.

The measurement documents can also be represented in a graphic form. You are connected to the Graphical Framework (GFW), which can be used to control various external graphic tools.

Measurement reading transfer

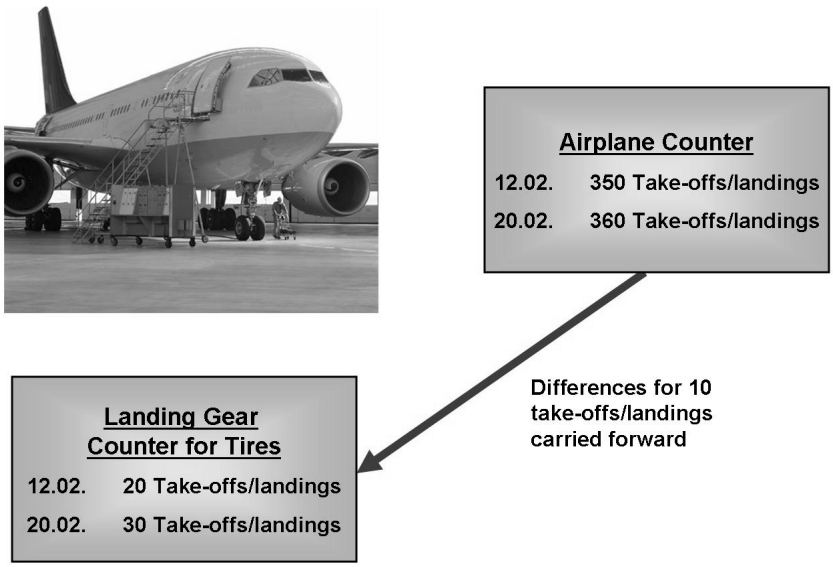

Figure 69: Measurement Transfer in Complex Hierarchies

The following types of transfer are possible:

- Measurement transfer from one measuring point to another (1:1 relationship)
- Measurement transfer from one measuring point to a number of others (1:n relationship)
- Counter reading transfer from one counter to another (1:1 relationship)
- Counter reading transfer from one counter to a number of others (1:n relationship)

A transfer of measurement and counter readings assumes the following:

Both measuring points or counters must have the same characteristic.

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Both measuring points or counters must be in the same object hierarchy. Measurement and counter readings cannot be transferred from external object hierarchies.

In the counter reading transfer, you can make use of **interval documents**. The counter readings from the subordinate levels of an asset structure are thereby aggregated into recurring entry documents. This considerably reduces the volume of measurement documents. The same measurement document is used for as long as the equipment is installed at the same functional location or superordinate piece of equipment. This means that there is only one measurement document for each installation interval of a piece of equipment.

- **Enter a measurement document with a historical reference time**
- **Transfer the measurement document, similarly to the historical object structure**

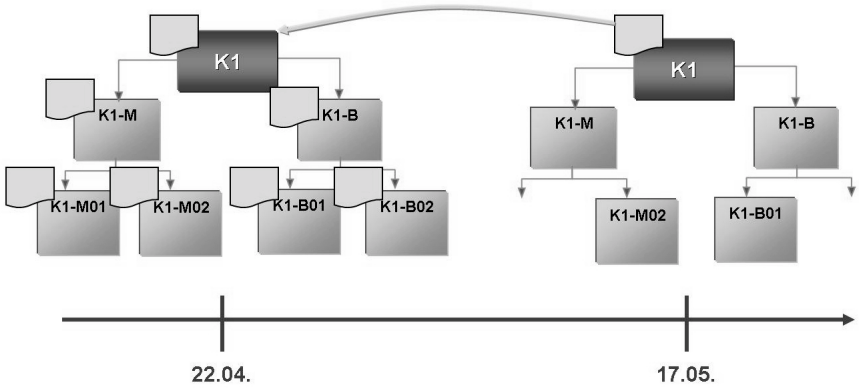

Figure 70: Time-Based Counter Reading Transfer

If a measurement document is entered for a historical reference time, it is transferred according to the object structure that was valid at the reference time, even if the object structure has changed in the meantime.

The structure of the functional location K1 has changed since 22.04. At that time, there were two additional functional locations (K1-M01 and K1-B02).

On 17.05, you enter a measurement document with reference date 22.04.

The values of the measurement document in the functional location structure are then transferred for the structure that was valid on 22.04, in other words, the system also transfers the values to functional locations K1-M01 and K1-B02.

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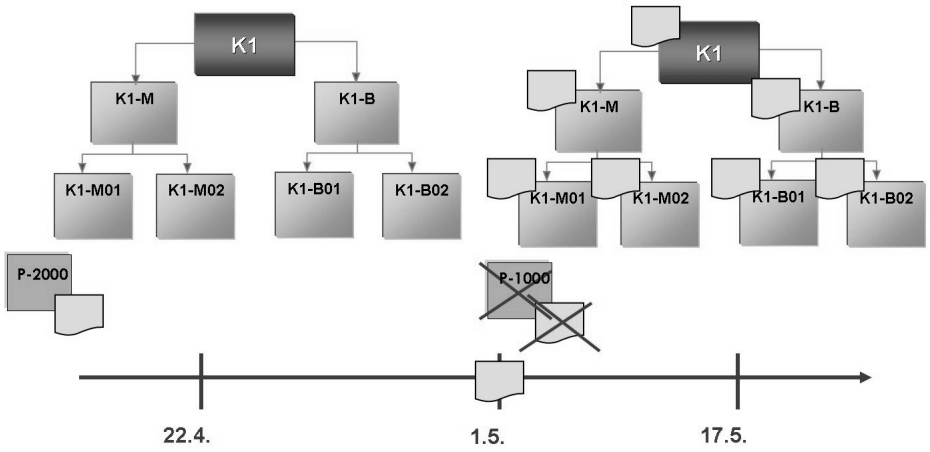

Figure 71: Installing and Dismantling With Historical Reference Time

If you install or dismantle a piece of equipment with a historical reference time, the system automatically cancels superfluous measurement documents and creates new ones, if necessary.

Example: You entered a measurement document on 01.05. This has been transferred to equipment P-1000 using the functional location hierarchy.

On 17.05, you enter that equipment P-1000 is replaced by equipment P-2000 with a historical reference date 22.04.

The measurement document is then deleted for equipment P-1000, since this had not yet been installed when the measurement document was created on 01.05.

However, a measurement document is generated for equipment P-2000, since this had already been installed when the measurement document was created.

Counter Replacement

The replacement of a counter must be displayed in the system if its register is defective and must be replaced by a new one, or if the entire counter must be renewed. As the reading of the new counter is usually not the same as that of the old one, the newly-entered measurement document is flagged to explain the discrepancy in the continually rising or falling readings.

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- **Represent counter replacement**

Meter read.date	Counter read	Indicator	Total counter reading
08/17/	20010		20010
08/24/	20100		20100
08/31/	20190		20190
09/04/	00400	Counter replacement	20190
09/10/	00410		20200

Figure 72: Counter Replacement

If you enter a measurement document that documents a counter replacement, the overall counter reading itself does not change. You enter the new reading of the newly-installed counter at the start of usage with this measurement document. This does not change the overall counter reading of the previous measurement document.

Customizing

- **Measuring point types**
- **Number ranges for measuring points/measuring documents**
- **System settings for measuring points/measuring documents**

Figure 73: Customizing for Measuring Points/Counters

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Exercise 7: Working with Measuring Points and Counters

Exercise Objectives

After completing this exercise, you will be able to:

- Create a measuring point or counter
- Enter measurement documents
- Perform a counter replacement

Business Example

In the company, the load should be monitored for a sequence of aggregates in order to have a complete object history, and a basis for performance-based maintenance planning. A counter for measuring operating hours, for example, is created for this purpose.

Task 1:

Creating a Counter

1. A counter should be created for each of the two cleaning water pumps of the middle building of the 2nd biological cleaning plant **##-BR2-2** of your clarification plant, in order to better monitor the load.

   Create an operating hours counter for each of the aggregates named.

   Which characteristic do you use?

   Which numbers are assigned for the counters?

Task 2:

Enter measurement and counter readings

1. Create an initial measurement document with a counter reading for each of the new counters. How do you proceed?
2. You should perform further counter reading entries for the aggregates in the mechanical purification of your clarification plant using a predefined measurement reading entry list that contains all the necessary counters.

   Create this measurement reading entry list for the technical objects listed above.

   How do you proceed?

   Which numbers are assigned for the measurement reading entry list?

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3. Enter the counter readings for the ventilator, sand and fat traps in the mechanical purification plant using the measurement reading entry list already created. How do you proceed?

Task 3:

Counter Replacement (Optional)

1. The counter of the **ventilator ##-M01-2** in the sand trap is defective and must be replaced. Perform a counter replacement.

Hint: First check the reading on the counter and, if applicable, enter an initial measurement document.

How is a counter replacement shown in the system?

2. Which value is entered and what effect does this value have?
3. Perform the counter replacement. How do you proceed?

   Enter another measurement document with a new counter reading. How do you proceed?

4. Display all measurement documents of the operating hours counter at the ventilator. How can you show the counter replacement in the list?

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Solution 7: Working with Measuring Points and Counters

Task 1:

Creating a Counter

1. A counter should be created for each of the two cleaning water pumps of the middle building of the 2nd biological cleaning plant **##-BR2-2** of your clarification plant, in order to better monitor the load.

   Create an operating hours counter for each of the aggregates named.

   Which characteristic do you use?

   Which numbers are assigned for the counters?

   a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location → Structural Display***

   Enter **##-BR2-2** and execute;

   select the cleaning water pumps:

Field Name or Data Type	Values
Cleaning water pump 1	*##-BR2-21*
Cleaning water pump 2	*##-BR2-22*

   Then branch to the master record detail view; switch to change mode

   Goto → Measuring Points/Counters

Field Name or Data Type	Values
Characteristic	`For example, OPH`
Description of measuring point	`Operating hours`
Counter ID	✓

   Then F3, save > The system displays the next master record – repeat operations accordingly.

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Task 2:

Enter measurement and counter readings

1. Create an initial measurement document with a counter reading for each of the new counters. How do you proceed?

   a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Functional Location → Measurement Documents → Create***

   Enter the counter number or look for the respective functional location (F4); enter the counter reading and save.

2. You should perform further counter reading entries for the aggregates in the mechanical purification of your clarification plant using a predefined measurement reading entry list that contains all the necessary counters.

   Create this measurement reading entry list for the technical objects listed above.

   How do you proceed?

   Which numbers are assigned for the measurement reading entry list?

   a) ***SAP menu → Logistics → Plant Maintenance → Management of Technical Objects → Environment → Measuring Points → Measurement Reading Entry List → Create***

   Enter a short text, ENTER; enter a description;

   Edit → Select Measuring Points

   Enter **##-M** in the field *Functional Location*, and execute

   > Mark all and select

   > Save and make a note of the measurement reading entry list.

3. Enter the counter readings for the ventilator, sand and fat traps in the mechanical purification plant using the measurement reading entry list already created. How do you proceed?

   a) ***SAP menu → Logistics → Plant Maintenance → Maintenance Processing → Completion Confirmation → Measurement Documents → Collective Entry → With Entry List***

   Enter the number of the entry list

   >The counters are ready for input

   > Enter the counter reading and save

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Task 3:

Counter Replacement (Optional)

1. The counter of the **ventilator ##-M01-2** in the sand trap is defective and must be replaced. Perform a counter replacement.

   Hint: First check the reading on the counter and, if applicable, enter an initial measurement document.

   How is a counter replacement shown in the system?

   a) Using a measurement document

2. Which value is entered and what effect does this value have?

   a) The current counter reading of the new counter is entered. At the same time, the overall counter reading of the old counter is retained. The difference for this measurement document is set to zero.

3. Perform the counter replacement. How do you proceed?

   Enter another measurement document with a new counter reading. How do you proceed?

   a) ***SAP menu → Logistics → Plant Maintenance → Maintenance Processing → Completion Confirmation → Measurement Documents → Create***

      Enter the counter number

      Edit → Replace Counter

      Enter the reading of the new counter

      >The difference is zero

      >The overall counter reading of the old counter is retained and updated when you enter new measurement documents

4. Display all measurement documents of the operating hours counter at the ventilator. How can you show the counter replacement in the list?

   a) ***SAP menu → Logistics → Plant Maintenance → Maintenance Processing → Completion Confirmation → Measurement Documents → List Editing → Display***

      Enter the number of the measuring point and execute

      Settings → Display Variants → Current

      Sort the fields in the right-hand box in ascending order; select the field *Counter replacement*, and copy

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Lesson Summary

You should now be able to:

- Describe the basic concept of the measuring point
- Describe the basic concept of the counter

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Unit Summary

You should now be able to:

- Describe the basic concept of the measuring point
- Describe the basic concept of the counter

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Course Summary

You should now be able to:

- Create and structure functional locations
- Apply equipments
- Apply classification
- Apply bills of material and assemblies
- Apply serial numbers
- Apply measuring points and counters

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Appendix

Customizing Paths for Technical Objects

Accessing Customizing:

SAP Menu → Tools → Customizing → IMG → Execute Project

Button *SAP Reference IMG*

Functional Locations

Field name or data type	Path
Alternative labeling	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Functional Locations → Alternative Labeling for Functional Locations***
List editing	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Functional Locations →*** ***Set List Editing for Reference Functional Locations*** ***Set List Editing for Functional Locations***

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Field name or data type	Path
Profile	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → General Data → Set View Profiles for Technical Objects***
Structure indicator	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Functional Locations → Create Structure Indicator for Reference Locations/Functional Locations***
Functional location category	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Functional Locations → Define Category of Functional Location***

Equipment

Field name or data type	Path
Define user status profile	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Basic Settings → Maintain User Status***
Assign user status profile	**For functional locations:** ***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Functional Locations → Define Category of Functional Location*** **For equipment:** ***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Categories → Maintain Equipment Category***
Automatic creation of technical system/equipment	***Financial Accounting → Asset Accounting → Master Data → Automatic Creation of Equipment Master Records***

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Field name or data type	Path
Business views	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Categories → Maintain Equipment Category***
Installation at functional location	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects→ Equipment → Equipment Categories → Maintain Equipment Category***
Usage history	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Categories → Maintain Equipment Category***
Equipment category	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Categories → Maintain Equipment Category***
Field selection for equipment master record	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Categories → Maintain Equipment Category***
Warranty type	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Bills of Material → Item Data → Define Item Categories***
Warranty category	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Bills of Material → Item Data → Define Item Categories***
Number ranges	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Categories → Maintain Equipment Category***

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Field name or data type	Path
Object type	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → General Data → Set View Profiles for Technical Objects***
Partner functions	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Bills of Material → Item Data → Define Item Categories***
Partner determination procedure	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Bills of Material → Item Data → Define Item Categories***
Profile	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → General Data → Set View Profiles for Technical Objects***

Bills of Material

Field name or data type	Path
Item category	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Bills of Material → Item Data → Define Item Categories***
BOM usage	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Bills of Material → General Data → BOM Usage → Define BOM Usages***

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Serial Numbers

Field name or data type	Path
Serial number profile	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Categories → Maintain Equipment Category***
Serialization operations and movement types	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Technical Objects → Equipment → Equipment Categories → Maintain Equipment Category***

Measuring Points and Counters

Field name or data type	Path
Measuring point category	***Plant Maintenance and Customer Service → Master Data in Plant Maintenance and Customer Service → Basic Settings → Measuring Points, Counters and Measurement Documents → Define Measuring Point Categories***

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Feedback

SAP AG has made every effort in the preparation of this course to ensure the accuracy and completeness of the materials. If you have any corrections or suggestions for improvement, please record them in the appropriate place in the course evaluation.

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